Classroom Computer News

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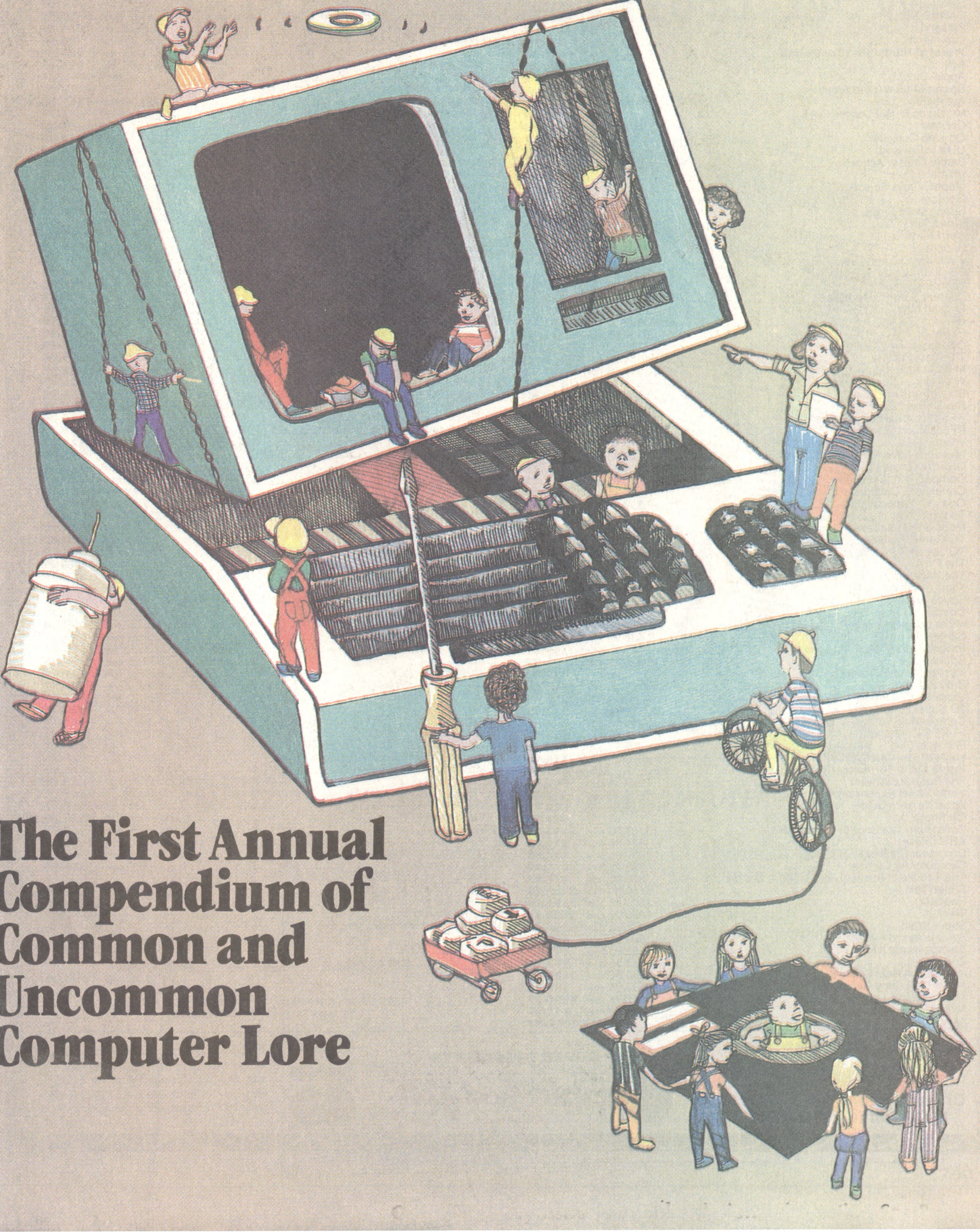

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MAY-JUNE, 1981

VOLUME 1, NO. 5

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What's Holding Back Computer Use in Education?

by Dan Isaacson

Detroit 1903—Henry Ford announces production breakthrough. One million Model T's to be produced this year. Will cost consumer $100 each.

Washington, D.C. 1904—Federal agency hearings today on why 900,000 Model T's are still in dealer showrooms. Dealers concerned.

Washington, D.C. 1904—American Automobile Association responds: In today's hearings, the AAA made the following points: (1) Ford's new technology dumped too many cars on the market before drivers were trained to drive them; (2) drivers could not be taught because there were too few trained driving instructors; (3) having an automobile is very exciting, but gas stations are too far apart—drivers run out of gas between stations; (4) building more gas stations would be useless since refined petroleum supplies are too low; (5) even if we started today, we'd need five to 10 years to design and build enough oil refineries to supply the demand; (6) not enough chemical engineers are trained to design and build the needed refineries; (7) the public is apathetic about this new technology since life has existed for at least 4000 years without it. The public believes it is too complicated and cumbersome to be more than a temporary fad.

Every seven years, the cost of computer power goes down by a factor of ten. Some claim that if the automobile industry had been able to develop its technology at the rate the computer

Please turn to page 28

MICRONEWS

- By the 1990s, educational computing will be a distinct market requiring models geared to each student level, predicts Nigel Searle of Sinclair Research Ltd. Searle, whose firm produces a pocket computer, says that the next decade's students will practice multiplication by talking into a computer the size of a credit card.
- Elementary schools can now earn TRS-80 computers as premiums from magazine subscription sales, due to a recent agreement between QSP, Inc., a Readers Digest Association subsidiary, and Radio Shack. To find out how to get the new technology by selling the old, contact William E. Drake, QSP, Inc., Box 2003, Ridgefield, CT 06877.
- A new, low-cost personal computer will makes its debut at the May National Computer Conference. The Osborne I, produced by the newly formed Osborne Computer Corporation, reportedly includes such features as disk drives and word-processing software. Adam Osborne, known for his books and articles on the microcomputer industry, founded the corporation.

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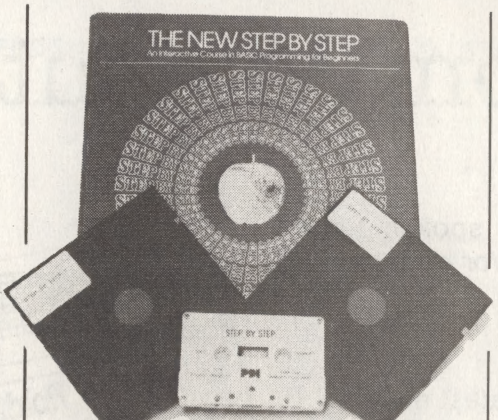
THE NEW STEP BY STEP

A Programming Course For Beginners



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You could enroll in a class—arranged at someone else's convenience, given by a technician who may not be a very good teacher. Or you could read a book—written by a programmer who may not be a very good writer. Or you could learn in your own home, on your own **APPLE®**, at your own convenience, using the course that has become a standard of the industry.

Introducing THE NEW STEP BY STEP, a programming course for beginners

In 1978, PDI introduced the original *Step by Step*. The student learned by interacting with his or her computer. Thousands of students learned how to use an **APPLE®** computer and the **Applesoft®** language with *Step by Step*. Now, using feedback from students, teachers and learning specialists, we are introducing *The New Step by Step*.

The New Step by Step, in addition to sound and effective teaching, includes computer graphics, animation, sound effects and a voice track.

What does THE NEW STEP BY STEP teach?

There are about twenty hours of instruction. Topics covered include:

- **PRINT** instruction
- Writing simple programs
- **INPUT**
- Loops **GOTO**
- **IF-THEN**
- Program counters
- Library functions such as **INT** and **RND**
- Screen formatting, including **TAB, VTAB** and **HTAB**
- Subroutines
- **READ-DATA** statements
- **FOR-NEXT** loops
- One-dimensional arrays
- Nested loops
- Low-resolution graphics
- Multiple-statement lines
- Program logic
- Floating point notation

How does THE NEW STEP BY STEP work?

The computer program shows screen displays or sample program outputs, while the audio cassette explains to the student what is being shown. After each instructional segment, the student is asked a question or asked to solve a problem. The computer checks the student's work.

When a lesson has been completed, the student turns off the cassette and goes to the *Step by Step Workbook* to review and practice the material covered in the lesson. After the practice assignment has been completed, the student takes a quiz.

A final exam is included.

How can THE NEW STEP BY STEP be used?

Schools can use *Step by Step* for individualized instruction in programming in **BASIC** and in computer literacy programs.

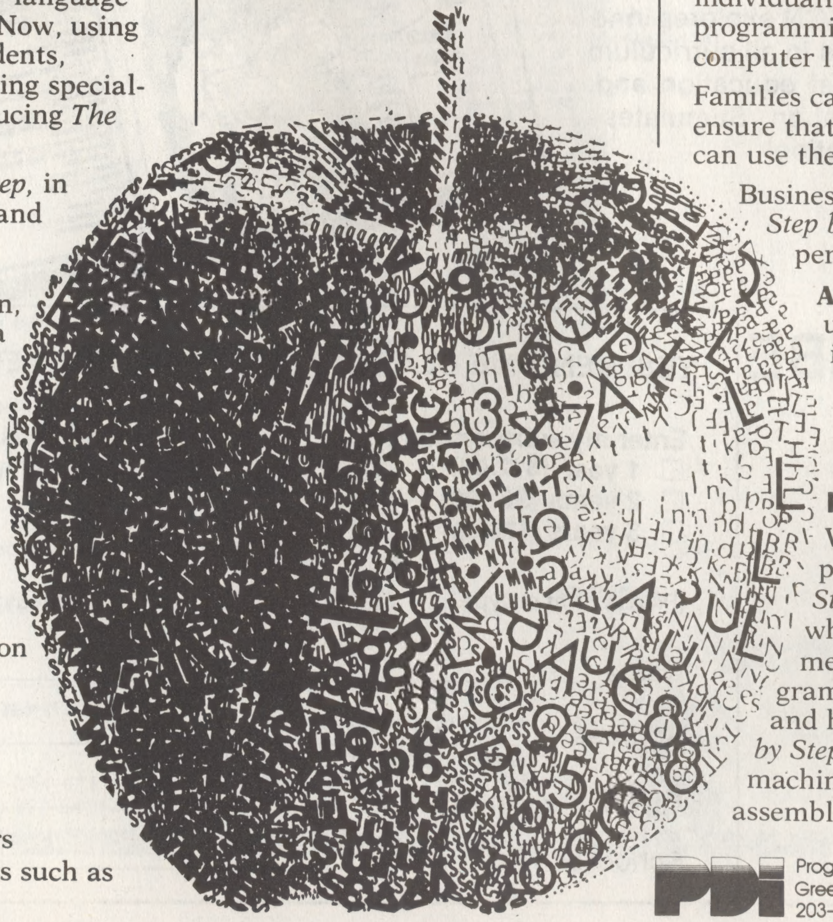
Families can use *Step by Step* to ensure that all family members can use the family computer.

Businesses can use *Step by Step* to train their personnel.

APPLE® dealers can use *Step by Step* to introduce prospective customers to the **APPLE®** computer.

What are PDI's plans for the future?

We are now in the process of developing *Step by Step Two*, which will teach intermediate **BASIC** programming, disk operation and hi-res graphics. *Step by Step Three* will teach machine language and assembler.



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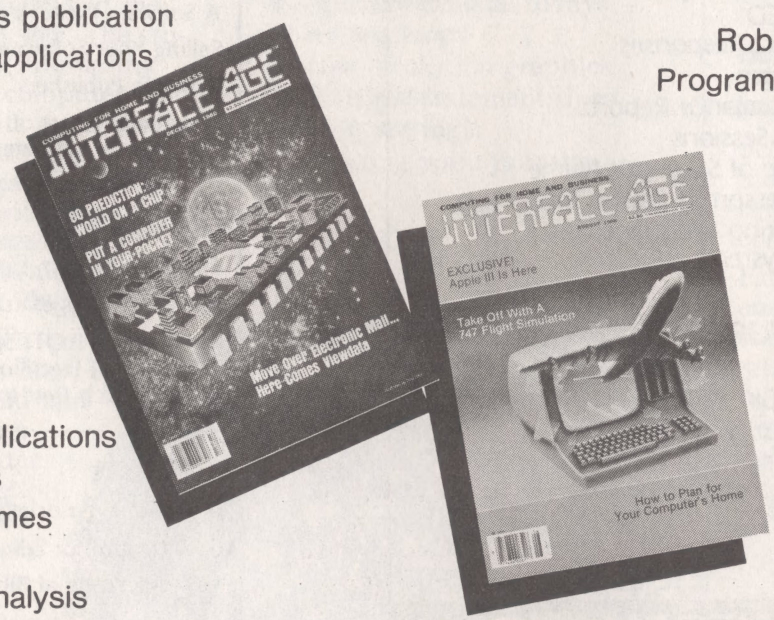
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FORUM

Learning Generators

by Lloyd R. Prentice

A friend of mine organizes his life around what he calls "learning generators." A learning generator is anything that motivates or promotes learning—a talented teacher, an inspiring book or an exciting conference. My friend calls himself a "knowledge junkie." He eviscerates a new book the way a starving lion devours an eland. He draws knowledge out of a teacher the way a swarm of mosquitoes sucks blood out of a delirious mountaineer. Limited income keeps his conference attendance within reason, but reference librarians stampede for the stacks when they see his bearish frame amble through the door.

I called my friend recently when I realized that I hadn't heard from him in more than the customary moons.

"Well, you know that I bought a Zenith H-89 last year," he told me. "This microcomputer thing is fantastic—took me awhile to get the hang of it, but for the last few weeks I've been into computational linguistics and matrix algebra—things I would never have dreamed of looking into before. Every program I write inspires six new ideas and forces me to explore three new areas. I buy commercial programs, but I have the most fun when I roll my own. If the program works, I know instantly that I've mastered the underlying idea. The microcomputer is the most incredible learning generator that the human mind has ever invented!"

Clay or Sculptor?

Tom Dwyer of the University of Pittsburgh refers to the computer as cybernetic clay. The potential of the computer is protean, he suggests, limited only by human imagination. My friend, the information junkie, sees it the other way around. The computer sculpts the mind of the user —human knowledge is what's protean, what is shaped by the computer and the uses we make of it.

While I'm attracted to both of these views, my fear is that the computer is more like a mirror. We program it to reflect our hopes and fears and the assumptions of our existing institutions. The popularity of space war games frightens me, as does the use of computers by bureaucracies to expand their powers at the expense of the human spirit. But maybe the computer is all of the above—learning generator, cybernetic clay and mirror of the human mind.

One thing is certain, however. We can't just put a computer into a classroom and expect either teacher or pupil to learn what it can do or how to use it. We have to prime the pump with information, orientation and training—give the prop a twist, crank it over the way they cranked the old Model T.

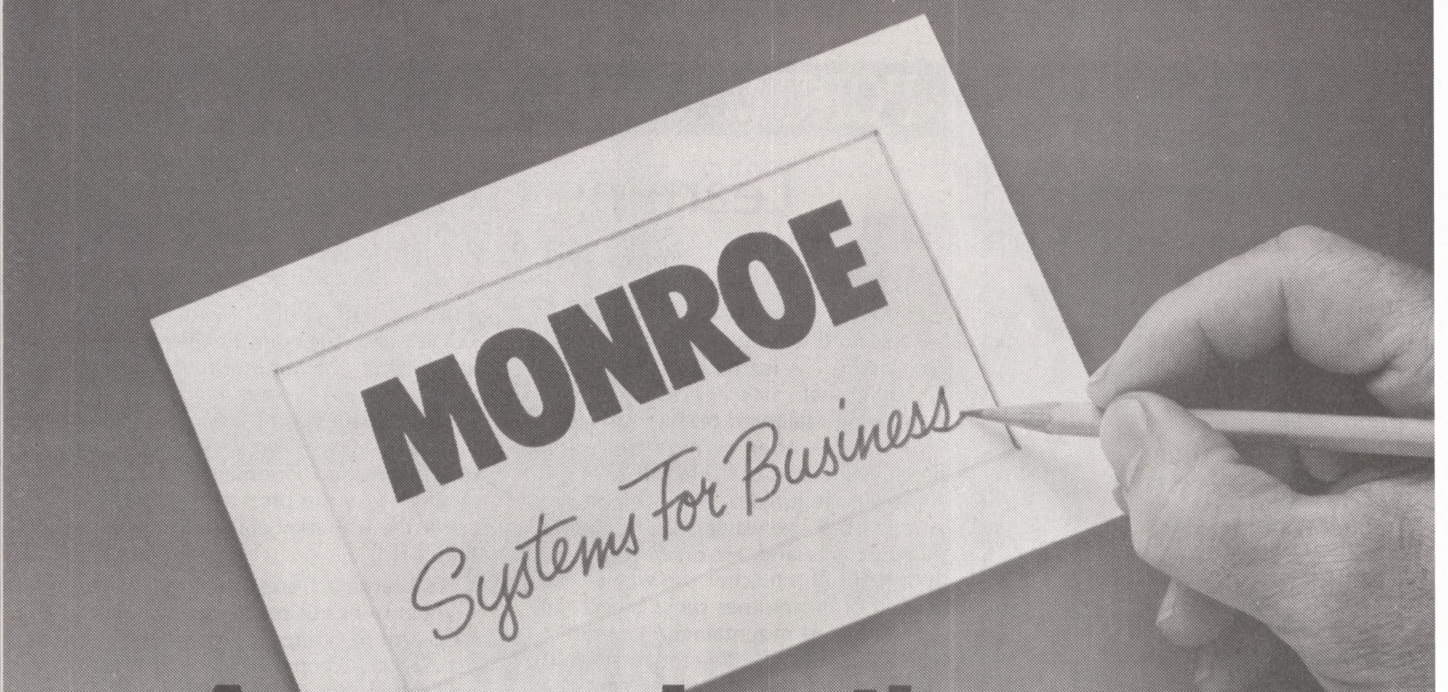
CCN's Learning Generator

Which brings us to this special issue of *Classroom Computer News—the First Annual Compendium of Common and Uncommon Computer Lore.* We think of this issue as a learning generator—as a guide to provide you with enough information about hardware, software and applications to get your own creative juices flowing. We talked with scores of experts, sent out thousands of questionnaires, culled through three file drawers of reprints, preprints, photocopies, notes and manufacturers' brochures to put it all together.

When we started planning this issue, our intention was to pack every conceivable resource of value between these covers. But reality quickly gained the upper hand—the educational computing field is simply growing too fast. But we do feel we've pulled together a valuable sampler. If we've missed anything of importance, however, please let us know. We're planning an even bigger and better issue for next year. If, on the other hand, you like what you find here, give a big hand to editors Laurie Beckelman and Phyllis Caputo, whose dogged work made it all come together.

Thank You, Thank You, Thank You

Our special thanks to Karl Zinn, at the University of Michigan, for making his educational computing data base, DATASPAN, available to us for this issue; to Elizabeth Bronnert for lending her impeccable librarian's eye to our research efforts; to Bob Haven at Dresden Associates, Nancy Roberts at Lesley College, Sandy Wagner at Computer-Using Educators, and Dan Watt and Adeline Naiman at Technical Education Resource Centers for tirelessly answering our phone calls with helpful information. They and many others pointed us in the right directions; we take full responsibility for the final product.



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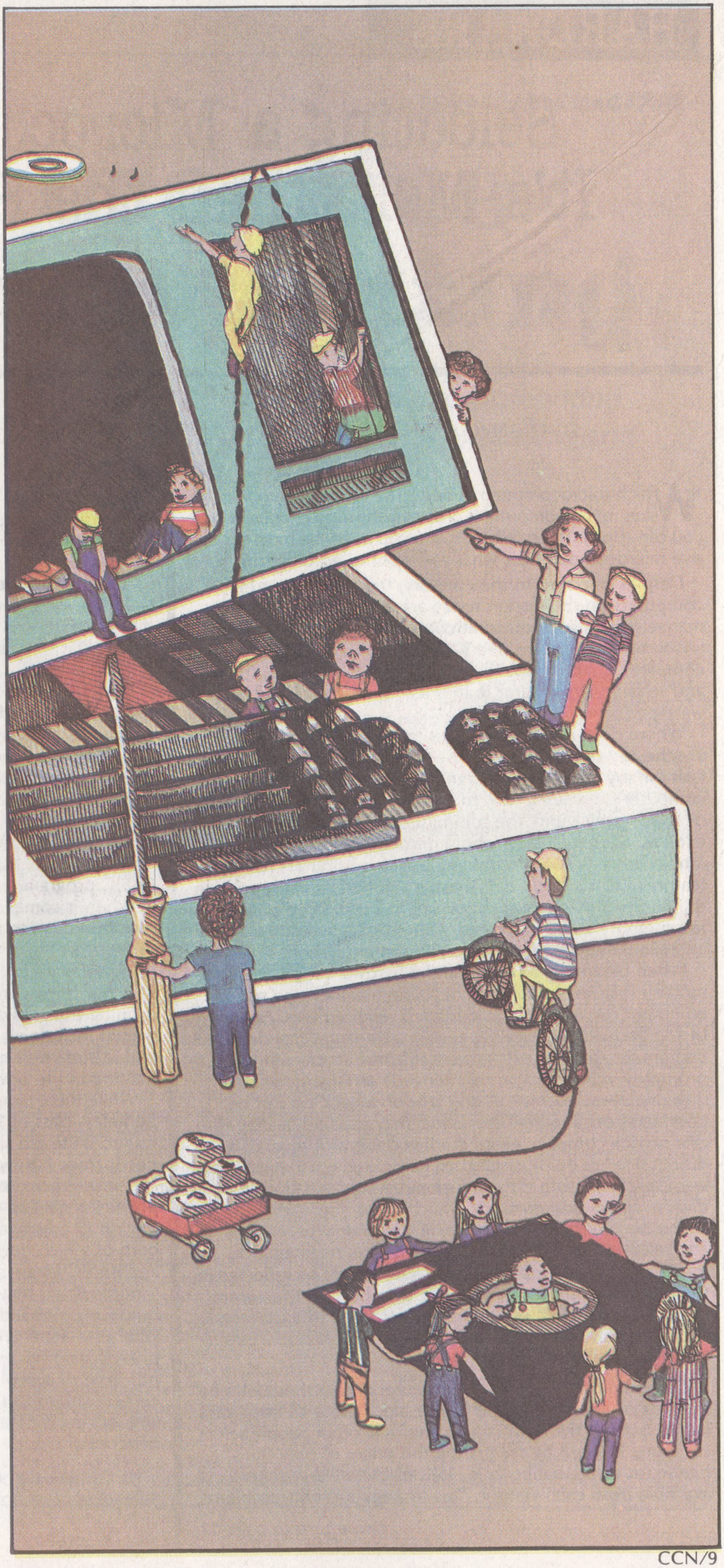
HARDWARE

If you can see it, touch it, smell it or lift it, it's "hardware." If you can type it on a keyboard or load it into a cassette or disk drive, it's "software." Some educators insist on calling curriculum materials "courseware" and recently we verged on mayhem when we heard a party refer to a book as "printware."

As an enlightened educator, it's best to keep your mind on the whole picture—ideas, machines, materials, kids, teachers, administrators, school boards and parents. But here we succumb to the "-ware" syndrome and focus on hardware and what to keep in mind when you're ready to buy.


Jane E. Goldman

Selecting a Microcomputer: It's More than the Hardware

Two aficionados share their views on what to look out for when purchasing a microcomputer

by Patricia Sturdivant

Which microcomputer is best? The answer is simple. The *best* microcomputer is probably the most expensive one you can afford. The question is, Do you need the most expensive microcomputer for what you want to accomplish?

Despite all claims to the contrary, the various microcomputers on the market today are fairly similar in performance. Obviously, you can't compare Radio Shack's TRS-80, which sells for $500, with a $2000 Apple II. But if you compare common capabilities, differences in service, support and software are greater than those in hardware and software performance.

Where does one begin to sort through the options? What are the key decisions one must make? The most important task for any committee charged with selecting a microcomputer is deciding how the equipment will be used. After defining applications, the committee can determine hardware choices. For example, a school district that wants to offer introductory BASIC programming with computers may find features such as color, disk storage and letter-quality printing unimportant. A low-cost alternative that uses a computer with less memory and a black-and-white display would cut costs and allow more students access to the equipment.

When beginning to examine the hardware itself, the committee's first responsibility is deciding whether one microcomputer can meet all the identified requirements. Adoption of a single machine provides certain advantages. Standardized equipment allows an exchange of software among schools and promotes more effective maintenance arrangements. If a disk drive breaks down at one school, a back-up can be provided from another. The district may also find dealing with one service company easier than working with several. If the district decides on one, standard computer, it will most likely want machines with different memory configurations for diverse computing needs.

The next major task is weighing the evaluation criteria. The relative importance of cost, hardware, maintenance, inservice training support and software should be reflected in the bid specifications. The vendor who bids on the system must know the level of importance attached to each factor. Each factor should be evaluated against independent criteria rather than by comparison.

Cost: In most cases, a microcomputer system should not be selected on the basis of the lowest bid. Cost is an important factor, but not the most critical one. Too often people select computer systems by comparing the prices of only the minimum configuration (e.g., 16K, black/white monitor) available from each vendor. This strategy presents problems

Please turn to page 12

by LeRoy Finkel

As the resident microcomputer consultant in a large county office of education, I am daily asked, "Which microcomputer shall I buy—Apple, Atari, PET or TRS-80?" My reply is to ask the two really important questions:

(1) What are the goals or objectives of your educational program using computers? (I offer a list of possibilities, if needed.)

(2) What software do you plan to use to meet those objectives?

The answers to these questions usually solve the hardware problem without further discussion. If you have determined your goals and have found software that will support them, you can usually choose only one computer: the one for which the software exists! This situation will change as more and more established educational publishers produce software for a variety of computers. But for the moment, the software answers the hardware question. Software is more important than hardware, especially if you plan to do more than teach BASIC programming.

When it comes to actually buying the hardware, your bid specifications can be as easy to write as this: "The ABC District plans to offer a computer literacy educational program using software called *Literate* by XYZ Publishers. We would like four microcomputer systems that will be capable of running this software in a classroom environment. Bidder should include all cables and connectors in the final price and include delivery, installation and X hours of teacher training in the price."

While this example is oversimplified, the radical in me (UC, Berkeley, class of 1961) says that this is certainly a legitimate way to write bid specs: write them to support your software needs since hardware specs are so difficult to write.

At the other extreme, you can copy the Minnesota Educational Computing Consortium (MECC) in Minnesota or Region IV Education Service Center in Houston, Texas, both of which developed exhaustive (30-50 page) hardware and BASIC language specifications.

Somewhere between these two is a happy medium. The real question is, What should you look out for and how do you get what you want? From Houston's experience we learn that price should be only part of your final consideration; you do not have to accept the lowest bid. Houston was more concerned with software and support from the manufacturer than with price. (See Patricia Sturdivant's article.) From other experiences I suggest this list of considerations:

(1) Require that maintenance service centers be within X miles of your school and that in-by-nine-out-by-five service be

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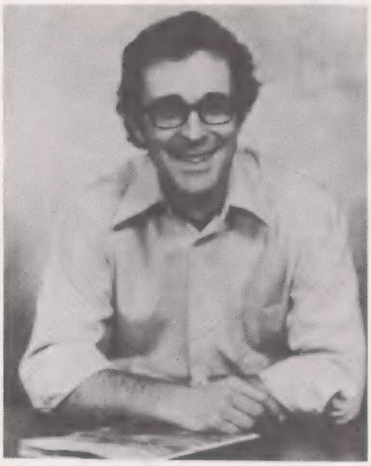
A REMARKABLE MAGAZINE

creative computing

"The beat covered by Creative Computing is one of the most important, explosive and fast-changing."—Alvin Toffler



David Ahl, Founder and Publisher of Creative Computing

You might think the term "creative computing" is a contradiction. How can something as precise and logical as electronic computing possibly be creative? We think it can be. Consider the way computers are being used to create special effects in movies—image generation, coloring and computer-driven cameras and props. Or an electronic "sketchpad" for your home computer that adds animation, coloring and shading at your direction. How about a computer simulation of an invasion of killer bees with you trying to find a way of keeping them under control?

Beyond Our Dreams

Computers are not creative per se. But the way in which they are used can be highly creative and imaginative. Five years ago when *Creative Computing* magazine first billed itself as "The number 1 magazine of computer applications and software," we had no idea how far that idea would take us. Today, these applications are becoming so broad, so all-encompassing that the computer field will soon include virtually everything!

In light of this generality, we take "application" to mean whatever can be done with computers, *ought* to be done with computers or *might* be done with computers. That is the meat of *Creative Computing*.

Alvin Toffler, author of *Future Shock* and *The Third Wave* says, "I read *Creative Computing* not only for information about how to make the most of my own equipment but to keep an eye on how the whole field is emerging.

Creative Computing, the company as well as the magazine, is uniquely lighthearted but also seriously interested in all aspects of computing. Ours is the magazine of software, graphics, games and simulations for beginners and relaxing professionals. We try to present the new and important ideas of the field in a way that a 14-year old or a Cobol programmer can understand them. Things like text editing, social simulations, control of household devices, animation and graphics, and communications networks.

Understandable Yet Challenging

As the premier magazine for beginners, it is our solemn responsibility to make what we publish comprehensible to the newcomer. That does not mean easy; our readers like to be challenged. It means providing the reader who has no preparation with every possible means to seize the subject matter and make it his own.

However, we don't want the experts in our audience to be bored. So we try to publish articles of interest to beginners and experts at the same time. Ideally, we would like every piece to have instructional or informative content—and some depth—even when communicated humorously or playfully. Thus, our favorite kind of piece is acessible to the beginner, theoretically non-trivial, interesting on more than one level, and perhaps even humorous.

David Gerrold of *Star Trek* fame says, "*Creative Computing* with its unpretentious, down-to-earth lucidity encourages the computer user to have fun. *Creative Computing* makes it possible for me to learn basic programming skills and use the computer better than any other source.

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At *Creative Computing* we obtain new computer systems, peripherals, and software as soon as they are announced. We put them through their paces in our Software Development Center and also in the environment for which they are intended—home, business, laboratory, or school.

Our evaluations are unbiased and accurate. We compared word processing printers and found two losers among highly promoted makes. Conversely, we found one computer had far more than its advertised capability. Of 16 educational packages, only seven offered solid learning value.

When we say unbiased reviews we mean it. More than once, our honesty has cost us an advertiser—temporarily. But we feel that our first obligation is to our readers and that editorial excellence and integrity are our highest goals.

Karl Zinn at the University of Michigan feels we are meeting these goals when he writes. "*Creative Computing* consistently provides value in articles, product reviews and systems comparisons . . . in a magazine that is fun to read."

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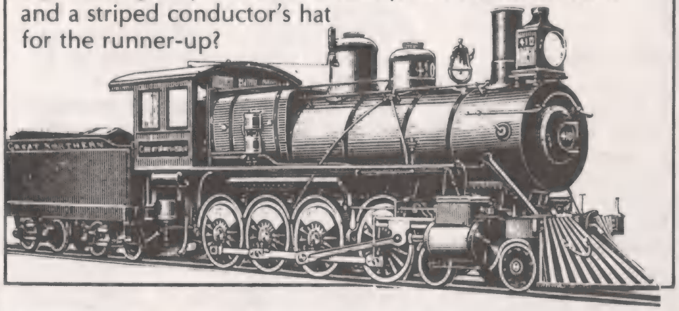
DATELINE: Pittsburg, Kansas

The year is 1881. Five railroad entrepreneurs, each with an investment fund of $1,000,000, pit wills and financial acumen as they vie for control of existing railroads, build new lines and improve old ones. They form partnerships, borrow money and speculate in securities in their grab for dominion over the iron horse.

The year, of course, is really 1981, and the would-be railroad tycoons are students in Professor Martin C. Campion's American history survey course at Pittsburg State University, Pittsburg, Kansas. Campion's *The American Railroad Game* is a computer-moderated simulation of the financing and building of railroads in the American West from 1870 to 1900. Designed for five to 30 players, it vividly demonstrates the opportunities and dangers faced by the builders of American railroads and also by those who merely speculated in railroad securities.

Campion originally wrote his game for the TRS-80. Now, thanks to an equipment grant from The Foundation for the Advancement of Computer-Aided Education, he is adapting it for the Apple II. As the game begins, four railroad lines already exist in the West and are shown on a computer-maintained map. The computer maps the further development of the railroad system, maintains a stock and bond market, and tracks the money, stock and bond accounts of the players and railroads. The player who either has the most money or controls the healthiest railroad at the end of the game wins. May we suggest fat cigars and gold pocket watches as prizes for the winner, and a striped conductor's hat for the runner-up?



Sturdivant

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because many manufacturers increase the price of peripherals to offset the competitive edge they have established in minimum-configurations bidding. Cost comparisons that include several configurations are more valuable. For example, a request for bids on a quantity order of microcomputer systems might specify several different configurations in the following proportions:

45% Minimum - 16K, keyboard, black/white monitor (9 inch), disk drive, controller
45% Typical - 48K, keyboard, color monitor (13 inch), disk drive, controller, 90 CPS (characters per second) printer
10% Optional - Modem, graphics tablet

Hardware and Basic Software: Bid specifications should separate features into logical categories that can be compared across vendors. Directly comparing operating systems or communications capabilities is difficult, but the evaluation criteria should include factors such as central processing unit performance, disk capacity, disk operating system (DOS) capability, expandability and language features. This short paper can't explain all of these factors, but a few features deserve special attention when evaluating a microcomputer system:

Expandability—Can the user upgrade the computer to increase memory capability? Is a wide range of peripherals available to expand the computer's capabilities?

Languages—Are languages besides BASIC available? (Higher level languages such as Pascal and PILOT are better for developing computer-assisted-instruction lessons.)

User Interface—Is the computer designed with the student in mind? Are lower-case letters available? Is the equipment durable? Is the video display easy to view?

Safety Features—Is the computer tamper-proof? Does the cover on the microprocessor lock so that students can't tinker with the inner circuitry?

Software: While making qualitative judgments about the software available for each machine is difficult, no factor is more important if the equipment is to be used for instruction. You should ask vendors to provide a list of software available in the areas for which the microcomputer will be used. They should also include ordering information (cost and address).

Maintenance: Accessibility to service is another essential consideration. You may require vendors to bid more than one service option with a variable number of points associated with each plan. Such plans might include walk-in, pick-up and delivery, and on-site service. Costs will be different for each option, but the options aren't mutually exclusive.

Vendors will usually provide a 90-day warranty; however, you should ask them to bid an extended warranty plan that will cover an additional nine or 12 months. You should also require that the vendor supply a list of organizations (contact persons and phone numbers) to which the dealer has provided service. Local dealers vary widely in their staffing and capability for providing maintenance service. Phone calls to current or past customers can provide useful feedback regarding user satisfaction. Even if a vendor has everything but good and convenient maintenance service, the computer will not be worth buying unless district personnel can service the equipment. You can provide for this by requesting that the vendor bid a maintenance kit along with the required staff training.

Inservice Training Support: Few manufacturers are prepared to provide adequate teacher training, though the situation is improving as manufacturers develop the needed materials. The importance of training should be stressed in bid specifications, since the vendor must realize that this support is important to winning the bid.

Find out what manuals and support materials, in what quantity, and how many days of consultation the vendor will supply for training. Request that a toll-free phone number be available for questions. Request samples of the training materials available (e.g., slide/tape presentations, videotapes) and of any other support services that should be considered.

Prior to bid submission, request that the potential trainer make a presentation to the selection committee. The best training materials will fail if they are not adequately presented by someone who can communicate without using technical jargon.

Selecting a microcomputer takes a great deal of planning. The vendor's reputation and longevity in the marketplace are important facts to consider. If the company goes out of business, finding replacement parts will be difficult, if not impossible.

In structuring bid specifications, indicate which provisions are mandatory, which desirable or optional. The points allocated to each category and feature will communicate the value you place on the various items. The microcomputer you select will most assuredly become obsolete because technology is changing very rapidly. But chances are, it will remain usable if it meets current needs.

If the purchase is large and the budget allows, recruit "outside" expertise. Ask a knowledgeable consultant to provide suggestions in writing. Everyone participating in the final decision should be well-informed and involved at every step. The selection committee should be prepared to justify its

Courtesy of Region IV Education Service Center

Inservice training support is a must, according to Patricia Sturdivant, who selected Bell & Howell to provide 600 microcomputers to Region IV in Texas. Training workshops like the one pictured above were part of the package.

choice. Good documentation of the planning process will assure that each individual knows why the microcomputer chosen is the "best choice" for the needs identified.

Patricia Sturdivant is coordinator of computer-based instruction at Region IV Education Service Center in Houston, Texas. In June, 1980, Region IV awarded a bid to Bell & Howell Company for 600 Apple II microcomputers. The considerations taken into account in hardware selection are outlined in this article. The bid process used at this intermediate agency was described in an earlier issue (November-December 1980) of Classroom Computer News.

Finkel

Cont. from page 10

available. Why should you chase all over the country to get your computers fixed and then have to wait days for them?

(2) Support your local computer dealers. You can more easily acquire support, training and new product information from a nearby computer store. If you buy from a distant source, your local dealer will not love to do your service, having made no money on the original deal.

(3) Require delivery, on-site installation and on-site training in the operation of the system. Spell out your training requirements exactly, but don't expect dealers to offer training in classroom teaching techniques.

(4) Be fair, but if you are buying lots of computers, insist on a discount of some sort.

(5) Somewhere in your bid specify that the bidder must include all cables and connectors required to set up and operate the computer. I have seen more schools eaten alive by nickel-and-dime charges for printer cables and the like. Why should that be your problem?

(6) Describe the software you plan to use and require that any hardware purchased *must* drive that software. I have seen some real problems with networked systems that weren't able to run certain software. Let your hardware dealer bid on the software. He makes a greater percentage profit on software than on hardware.

(7) When you buy software from major publishers, shake them up by requiring that they train teachers to operate their software!

A good way to start your search for a microcomputer is to send out a Request for Information (RFI) to all potential bidders, describing what you plan to do with computers and how (networked, etc.). This RFI will cause interested parties to call for more specifics and will bring a whole raft of valuable information your way. From it, you can pick and choose the things you like and then "go out to bid" with a formal Request for Quote (RFQ).

One final word of caution that applies equally to hardware and software: until you can see it in operation with students, touch it yourself, it does NOT exist. Do not buy promises about future products and delivery dates. Demand to see the goods yourself, in operation, before you give serious consideration to buying.

Good luck!

LeRoy Finkel, a business education teacher and a microcomputer consultant to the San Mateo County Office of Education, Redwood City, California, has co-authored four books on BASIC. Two more are in press.

National Bid Offices

Apple Computer Inc.
Call—Regional Sales
Referral No.
800/538-9696

ATARI, Inc.
Bid Dept.
P.O. Box 427
1265 Borregas Ave.
Sunnyvale, CA 94086
Or call: Customer Support
and Consumer Service
800/538-8547

Bell & Howell
Dept. 8541, Marketing
Administration
7100 McCormick Rd.
Chicago, IL 60645

Commodore Business
Machines, Inc.
Marketing Dept.
950 Rittenhouse Rd.
Norristown, PA 19403

Monroe Systems for
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Ohio Scientific, Inc.
Sales Support
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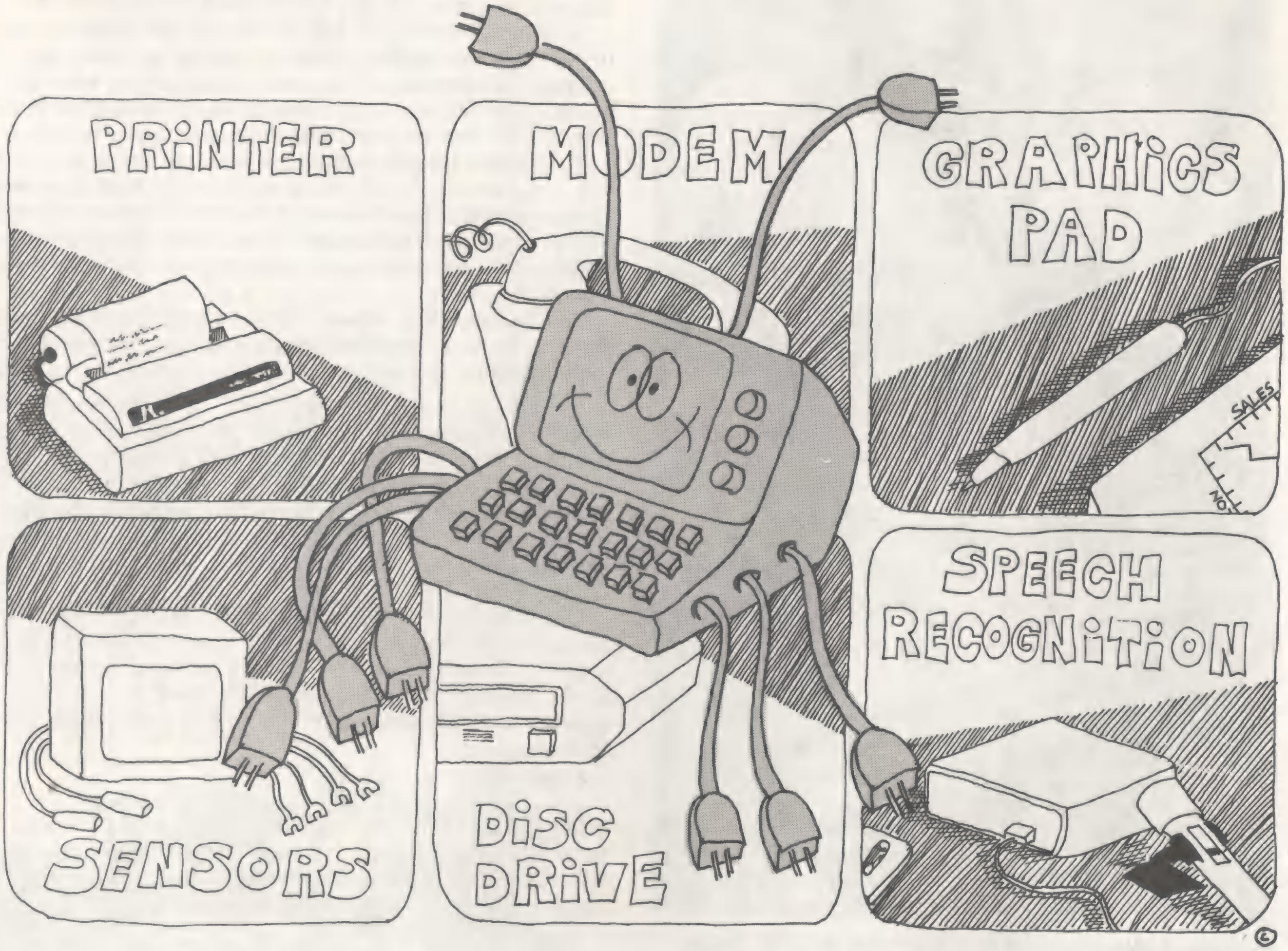
Bedford Heights, OH 44146
or call—Dealer Referral
No. 800/321-6850

Radio Shack
National Bid Dept.
1600 One Tandy Center
Fort Worth, TX 76102
or call—Customer Service
800/433-1679

Texas Instruments, Inc.
Home Computer 99/4
6000 Denton Dr.
Dallas, TX 75235



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ALL THOSE ADD-ONS

If you liked Lego sets or Barbie dolls, you'll love microcomputers. Microcomputers offer near-endless modularity.

The world of microcomputer add-ons, or peripherals as they're called in the trade, is large, expanding, expensive, frustrating and very exciting. The right peripherals transform a mild-mannered microcomputer into a super-functional machine.

A bare-bones microcomputer is a powerful machine as is, but its only mode of input is the keyboard, processing power and memory are limited, and its only output is the video display. Carefully chosen peripherals can multiply input options, speed up processing, expand memory and allow you to control everything from music synthesizers to theater lights. But choosing wisely can be frustrating and scary indeed.

For one thing, there's a bewildering choice of peripherals on the market—and every one sounds better than the last. For another, peripherals are expensive—you can spend more on a printer than you spent on the basic computer. And finally, it isn't always just plug-in-and-run in the peripheral world today—many peripherals require technical skills on the part of the installer to get them up and running.

But, in an important sense, peripherals make the machine. They determine how and in what form data get fed into the computer. They determine how and in what form information is passed from the computer back to the user. And, with the exception of software, proper peripherals determine more than anything how convenient and useful the computer is to the user.

Cost-conscious educators must keep educational value in mind when they select peripherals. A speech synthesizer may be just a toy to the math teacher, but in the reading lab it may be just the ticket. A graphics pad, which transforms line drawings into digital data, may be a frill in the social studies class, but may allow the school psychologist to perform psychological tests never before possible.

The Indispensable Add-ons

A functional computer system must have at least three peripherals, and more realistically four. The basic three are keyboard, video display and mass storage or memory. The fourth is a printer. If your computer does not come equipped with one or more of these four necessities, you should plan to buy what you need to fill out your system.

If you need to add a video monitor to your computer, as you do with Apple or Atari, you have two basic choices—use a standard video monitor such as found in a television studio, or use an inexpensive converter called an r.f. modulator connected to a standard television set. Both black-and-white and color video monitors are available and cost upward of $125 (b&w) and $350 (color). R.f. modulators cost from $30 to $100. Video monitors give a higher quality picture while, if you already have a television set, the r.f. modulator approach is cheaper.

Mass memory is to a computer what a filing cabinet is to an office. Mass memory allows you to store programs and data for use whenever you need them.

There are two popular approaches to mass memory—tape and disc. Tape storage devices for small computers range from inexpensive, standard audio cassette recorders to an interesting device made by Exatron called a Stringy/Floppy. While inexpensive, the main disadvantage of the audio cassette is that it is dreadfully slow—five minutes to load a program is not unheard of. The Stringy/Floppy, which uses an endless-loop microcassette, is much faster, more reliable and, at $250, about five times more expensive than a tape cassette, but it is slower and less expensive than a disc drive.

Disc storage is the standard mass memory technology today. There are two types of disc—floppy and hard. A floppy disc is a magnetic oxide-coated plastic disc encased in a plastic sleeve. A disc drive is like a record player with a magnetic playback/record head instead of a needle. The floppy disc can be inserted into or removed from the disc drive by the user. Two floppy disc formats are in use today—the 8-inch "standard" floppy and the 5½-inch minifloppy. The minifloppy is adequate for most classroom applications while the 8-inch floppy is more appropriate for administrative applications.

Hard discs are rigid magnetic-oxide coated discs hermetically sealed inside the disc drive. Hard discs store and retrieve information several times faster than floppies and store up to 1000 times as much information. The smallest floppy disc can store up to 50 double-spaced typed manuscript pages, while the larger hard discs can store up to five volumes the length of the King James Bible.

Since the smallest floppy disc drive costs about $500 and the larger hard disc drives about $5000, it's clear that the cost per character of storage goes down considerably as the storage capacity of the drive goes up.

A printer allows your computer to produce "hard copy." It is useful when you want students to share their work. It is essential when you're trying to write programs or when you want permanent records of student progress or of classroom or administrative reports.

The printer market is very competitive today, with scores of manufacturers competing for your dollars.

The trade-offs in printer selection involve price, print quality, reliability, speed, paper cost and handling, service and noise level while the printer is operating. The two main printer technologies for small computers are thermal and impact. Thermal printers use electrical discharges onto special paper to form characters. Impact printers hammer an inked ribbon against the paper. Thermal printers are cheap ($300 to $500), quiet, fast (up to 150 characters/second), but produce mediocre print quality and use expensive aluminized paper. Impact printers range in price from $300 to $3000 and in quality from the fast-and-dirty to near type-set quality. In general, print quality and reliability correlate most highly with price.

Other Goodies

Other types of peripherals can be categorized into four broad groups—input, processing, communication and output. Input peripherals sense or respond to the real world and produce data in a form that the computer can use. Processing peripherals help speed up data processing. Communication peripherals allow your computer to talk with other computers. And output peripherals display information in a meaningful way or control electrical devices in the real world.

Here's a potpourri of devices to get your imagination moving.

Several manufacturers produce clock/calendar peripherals for microcomputers. These input devices allow the computer to know the time and date.

Temperature, light, thermal and pressure sensors can be hooked up to computers in many ways, suggesting applications in science and shop classes and in building security and environmental management. One manufacturer provides inexpensive hardware and software ($125) to convert nearly any microcomputer into a sophisticated bio-feedback system.

Voice recognition is a reality today. Devices are available for less than $300 that will recognize 64 or more spoken words.

Want to hook a video camera to your Apple? You can do it with a video digitizer available for less than $350. Other devices allow you to control slide projectors and video cassette machines permitting interactive audio-visual presentations.

A graphics pad, available for less than $1000, lets you put maps, diagrams, floor plans or drawings into your computer.

Auto-answer modems enable your computer to answer the phone and communicate with data bases and other computers across the country; some models will even dial out and send a program, data or text to another computer at the time of your choosing—even in the dead of night.

Video projectors solve a big problem for teachers—they display computer text and graphics on a big screen, but the cost is equally big, like, say, several thousand dollars.

Or how would you like a robot turtle that starts, stops, turns, blinks, beeps and draws pictures under computer control? It costs $600 and eats less than a cat.

If you want your computer to talk, it's possible with a voice synthesizer ($100 to $500), but why not think about a peripheral that allows your computer to play music? Such a device comes standard from Apple and Atari, but if you want to impress the music teacher, you may need to spend $1000 or more.

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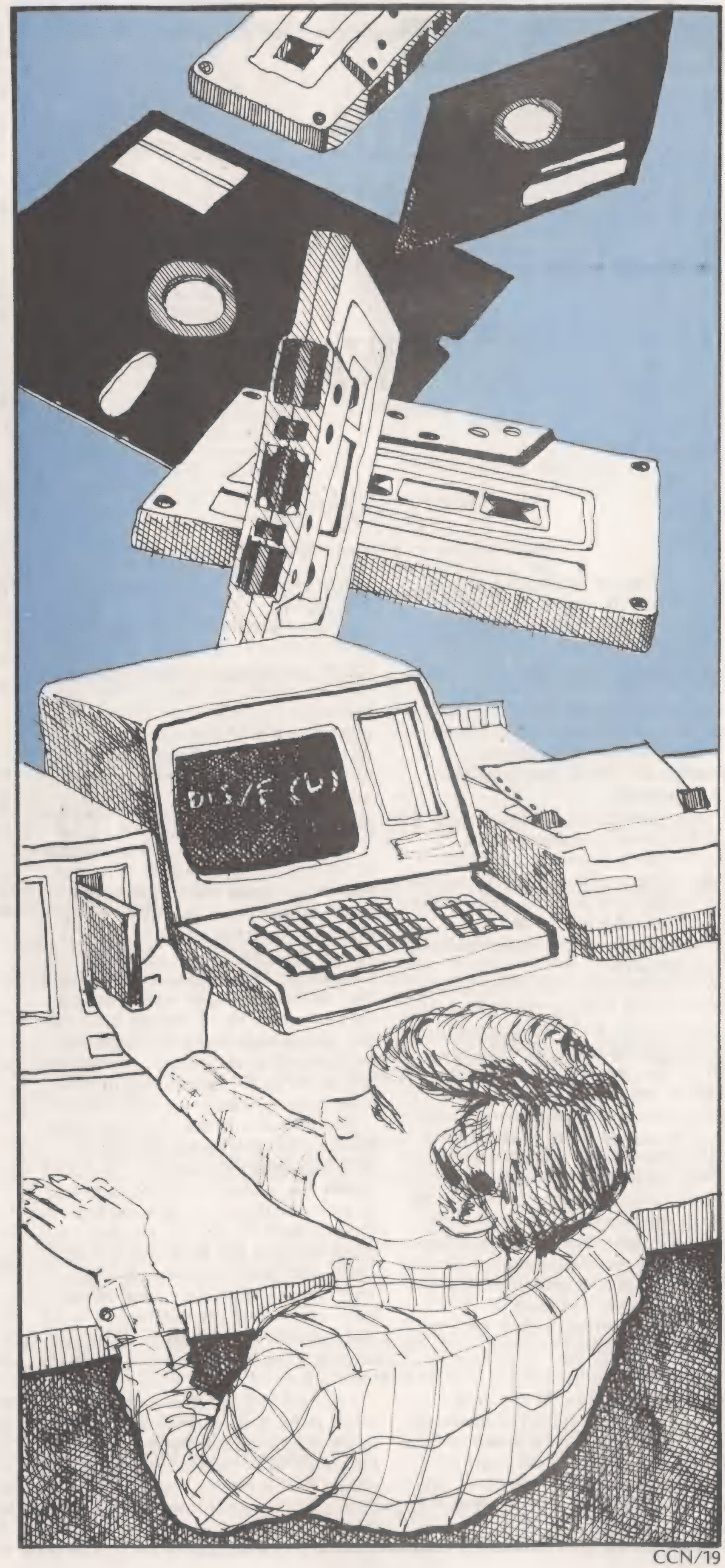
SOFTWARE

Software is what makes computers interesting to teachers, students and administrators. Well-designed software can ease a teacher's administrative chores, put zip into a lesson, keep track of library books or help a school save money on energy costs.

In this section, we present many perspectives on software—who makes it, how to gauge it, where to sell it and where to buy it.



Jane E. Goldman

THE MAKING OF SOFTWARE

by Henry F. Olds, Jr.

The making of quality educational software—programs that take advantage of microcomputer technology for learning—is lagging far behind the rapid spread of this technology throughout our society. A desperate need remains for software that integrates the best of what we know about effective education with a comprehensive understanding of the potential of the technology.

Many educational software developers are clearly skeptical about whether teachers would appreciate quality if they could have it. They believe that teachers will always opt for familiar and traditional educational materials, even if offered a choice that includes far better products.

Yet teachers know as well as anyone the failures of many traditional educational curricula and methods, and they understand the subtlety and variety of human learning. They *do* sense the power of computers to make feasible intellectual activities heretofore unwieldy, if not impossible. They *can* recognize quality software and make good choices if those choices are available.

If educational software is to avoid the weaknesses of past materials, it must carefully integrate knowledge of educational theory, educational practice, curriculum design and computers. And this knowledge must be blended with a sensitivity to learning and to learners, children and adults.

Content

Effective instruction of any kind begins with a well-conceived model of the discipline, one that reveals the discipline's key ideas. A great many of these key ideas, once understood, are simple, elegant and powerful. They must be communicated in such a way that students can grasp their simplicity, appreciate their elegance and feel their power.

Often, teachers point out, a diversity of instructional approaches is required to communicate any important concept effectively and deeply. The computer can make available a far greater variety of instructional forms than has ever been easily accessible before: simulations, tutorials, games, etc.

Cognitive Development

The computer allows and encourages a "constructivist" approach to human learning. It is not the only approach worth taking, but it may be the most powerful. It makes one fundamental assumption: the learner constructs knowledge. In this approach, the child's own understanding of reality forms a base on which he or she can build the intellectual tools that will further that understanding. Learning occurs when the child has the opportunity to construct new knowledge for him or herself.

Educational software should provide carefully designed opportunities for such knowledge construction. It should enable the student to invent ideas and to play with them. At the same time, it can also help the student develop concepts and skills that fall within the traditional disciplines. Creating such software requires both the formal knowledge of research on children and learning, and the informal knowledge teachers develop through contact with kids.

Teachers feel that good software ought to be non-judgmental. It should neither constrain the student's instincts nor insult his or her intelligence. It should have a fluidity that matches the fluidity of the mind. It should help students to reach beyond conventional ideas by encouraging creative guesswork, speculation, playful trial-and-error learning. It should provide feedback to the student, but it should not pretend to be a teacher by attempting intelligent interventions. How a program responds to a student's errors is a particularly critical indication of how it views that student's learning.

Pedagogy

The construction of new knowledge, as Piaget noted, is an interactive process, a dialogue carried on by the learner with the physical and social worlds around him. Pedagogy is concerned with the nature of that interaction and seeks to create conditions that enhance it. Since the computer is fundamentally an "environment" for interaction, knowledge of effective pedagogy can insure that its use supports the process of learning.

Teachers know when software is pedagogically sound. Furthermore, they feel that it should not dictate their own pedagogy but should adapt to it. Software should aim to include and involve the teacher, not to exclude and bypass the teacher. Not all educational materials should become software, and the relationship between software and printed materials needs careful study.

Software Design

Since the computer is fundamentally interactive, it is fundamentally educational. Good educational software will grow quite easily out of an understanding of this nature. But when the design of software conflicts with the nature of the computer (as is always the case, for example, when print materials are turned into software), the product reflects all the tensions of the forced marriage. We must not simply try to overlay our old ideas of curriculum and learning on this new technology.

> *If educational software is to avoid the weaknesses of past materials, it must carefully integrate knowledge of educational theory, educational practice, curriculum design and computers.*

Teachers recently surveyed* emphasized several important aspects of good software design. Software should have a clear purpose, one that demonstrates why the computer is appropriate for the learning task. It should, wherever possible, present content through all available modes: text, graphic, auditory and kinesthetic. It should use the computer's memory to allow students to review work recently completed. It should also provide students with access to help at any time (the ultimate referral should, of course, be to the teacher). It should take advantage of the dramatic possibilities that interaction with a computer can afford. And, it should not be limited to one-on-one interactions. Software can be designed to engage two or more students in a collaborative learning endeavor. Such shared learning has many benefits, not the least of which is proving that computers are not necessarily antisocial.

If the computer is to fulfill the promise of improved educational opportunities, we must learn to think about curriculum and learning in new ways—ways that are compatible with a technology that by its very nature lends itself to our efforts.

Henry F. Olds, an educator, writer and teacher-trainer, is co-author of People and Computers: Who Teaches Whom?

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*For more information on this survey, see *People and Computers: Who Teaches Whom?* by Henry F. Olds, Jr., Judah L. Schwartz and Nancy A. Willie. Copies are available for $3.25 from Educational Development Center, Inc., 55 Chapel St., Newton, MA 02160.

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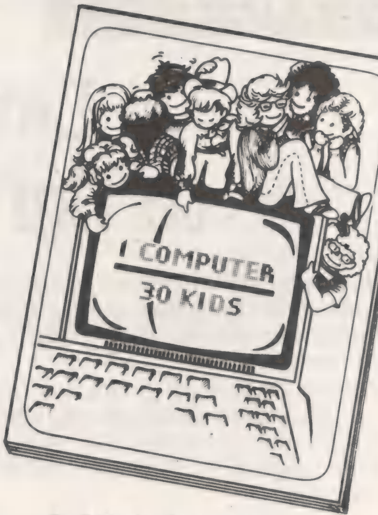

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Both packages are intended for use within a microcomputer environment consisting of: an 8032 Commodore computer; an 8050 Commodore disk drive; a 4022 Commodore printer. ***Note:*** Schools with more than 350 students in a given grade level will require the 8096 Commodore computer. Schools with student populations of less than 1000 can employ the 4040 Commodore disk drive. A centronics 737 or a Commodore 8024 printer may be used instead of the 4022 printer.

The software has been designed so that school personnel can readily follow the step-by-step instructions which appear on the computer screen during program operation. These same instructions, with additional explanatory comments, appear in the detailed ***User's Guide*** which accompanies the software packages. Copies of this Guide may be obtained from Microphys for $25; this price is credited toward the purchase of either system.

A four-hour training ccourse and a software-service contract are available for each of the above packages. Administrators and concerned school personnel are urged to write for sample print-outs, additional information, and, where possible, a complete demonstration of the entire system. The financial savings and educational benefits to be accrued by the adoption of this system are tremendous and should be explored by virtually every school.

Educators should write for the Microphys Summer Catalog which describes over 180 programs for use in Chemistry, Physics, Calculus, Mathematics, Vocabulary, and Spelling classes on both the high school and college levels.

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A Level-headed Guide to Software Evaluation

The plaint is as familiar and insistent as the summer sun: "But how do I know what software to buy?" We hear it over coffee at conventions; see it in the faces of perplexed friends at computer shows.

The question really encompasses two concerns: How do I get good information about software when I have neither the money nor the time to try it out myself, and how do I evaluate the programs that I do see? Neither concern is easily answered.

Sources of Evaluation

The avid teacher could spend many a rainy Sunday clipping and filing educational software reviews. Numerous publications, including such stalwarts as *The Computing Teacher* and *Creative Computing,* publish reviews, as do the newsletters of such user groups as Computer-Using Educators and the Michigan Association for Computer Users in Learning. But no ERIC-type clearinghouse exists to streamline the search for seventh-grade science program reviews or for remedial programs in the language arts.

A newcomer to the field, *School Microware Reviews,* is a semi-annual publication devoted exclusively to reviews. Publisher Bob Haven is actively soliciting user evaluations. Write him at Dresden Associates, P.O. Box 246, Dresden, ME 04342, for an evaluation form. (A list of user groups and their services appears on page 50.)

Educational computing centers are another good source of evaluations. The North Carolina Instructional Computing Project, for example, maintains the Educational Media Review and Evaluation Center. Teachers may come in to read reviews. Similarly, the microcomputer center at the Alameda County Office of Education in California reviews public domain software contributed by teachers and makes those reviews available to educators the office serves. (See page 56 for a listing of these and other resource centers.)

But again, no central source of educational software evaluations yet exists. MicroSIFT, the only effort to establish a national clearinghouse for software reviews of which we are aware (see page 26), has yet to work out the details of dissemination. One interesting project to watch: The Microcomputer Resource Center at Columbia University's Teachers College, under the direction of Karen Billings, and EPIE Institute, the country's only educational consumer advocacy group, have joined forces to evaluate the larger curriculum packages now available (Milliken's *Revised Math Sequences,* for example). The results should be available this summer or fall. (See Centers, Sources and Sorcerers' listing for addresses.)

Do-It-Yourself Reviews

Educators often feel they need a pinch of technological wizardry in order to adequately review software. Not so. Technological whiz-bangs are valuable only if they enhance the instructional intent of a program. And who can better evaluate the instructional value of software than the teacher who will use it? Banish all thoughts of inadequacy when approaching the task of software evaluation. The truly important technological considerations—does the program run? can students crash it by pressing the wrong key?—are ones you are eminently qualified to assess.

The National Council of Teachers of Mathematics has produced an excellent new booklet, *Guidelines for Evaluating Computerized Instructional Materials,* for all teachers interested in software evaluation. The booklet offers information on obtaining software, guidelines for review, an easy-to-use evaluation form, and suggestions and a form for writing software documentation. It is available for $3.75 from the council. Council members, bookstores or orders of 10 or more copies shipped to the same address qualify for a 20 percent discount; all orders $20 and under must be accompanied by remittance. Mail checks payable to the National Council of Teachers of Mathematics to the council at 1906 Association Drive, Reston, VA 22091.

CCN's Software-at-a-Glance

Another deterrent to home-grown software reviews is the feeling that reviews must be long and detailed to be good. We don't think so. Few teachers have either the time or the interest to fill out complicated review forms. Nor do they need to. The basic information teachers need to assess the value of a program can fit on a five-by-seven index card.

The Software-at-a-Glance card on the accompanying page can be the beginning of your software review library. Put a five-by-seven file box in your school library or in another central location; photocopy our card or create your own; hand cards out to teachers in your school (or district) who use computers; and begin building a resource that can aid any computer-using educator in your school. The file can serve as an index of programs already in the school, with the location and ID number of the program clearly marked in the upper right hand corner, and as a log of programs teachers have seen elsewhere.

Some suggested points to consider when formulating your review follow, but first one rule of thumb: for the sake of brevity, you need comment only on those aspects of a program that are exceptionally good or bad. If the program flashes X's whenever an answer is correct, by all means comment on the inappropriate response. But if it provides the predictable retinue of smiling faces and "Good jobs!" stay silent. Similarly, make a note of documentation that uses the clearest language you've read since Hemingway, but don't mention ordinary, acceptable fare.

Here are some things to consider when filling in the description and remarks sections of the form.

Description

Beyond a brief overview of what the program does, consider:

- Is the program designed for individual or group use?
- Is it especially appropriate for remedial, gifted or special needs students?
- How long is it?
- Do any good support materials come readily to mind?

Remarks

Does the program make good use of the computer?

- Could a workbook do the same job? If so, is the exercise worth the price of a computerized version?
- Do the graphics and sound contribute to the program or are they distracting or ancillary?
- Is information presented in varied formats?

- Does the program allow for a good deal of interaction?
- Do management routines really make your job easier?

Is the program easy to use?

- Does it load correctly and run without errors?
- Is the documentation clear?
- Are the instructions clear?
- Can the user get help by returning to instructions or content material if necessary?
- Can he or she skip over familiar instructions?
- Is the program bomb-proof?

Is the program pedagogically sound?

- Is the content correct?
- Is the spelling correct?
- Is the instructional objective clear and appropriate?
- Is the level of presentation consistent?
- Is the treatment of right and wrong answers suitable? Are the rewards for right answers more appealing than those for wrong?
- Do the kids like it?
- Do you like it?

Our thanks to Sandy Wagner, one of our regional contributors and a founding member of Computer-Using Educators in California, for helping us put this review procedure together. Please let us know if it works for you. Send us any additions or amendments. We plan to use this form for *Classroom Computer News* reviews and want to make it as helpful as possible.

Software-at-a-Glance

A file box and this simple form are all you need to start your own library of software reviews.

Program:
Source:
Price:
Subject:
Type: CAI CMI DP S G T TE DB

ID no.:
LOCATION:

DESCRIPTION:

REMARKS:

REVIEWER'S NAME:

LEVEL: K 1 2 3 4 5 6 7 8 9 10 11 12
RATING: 1 2 3 4 5 6 7 8 9 10

Key:
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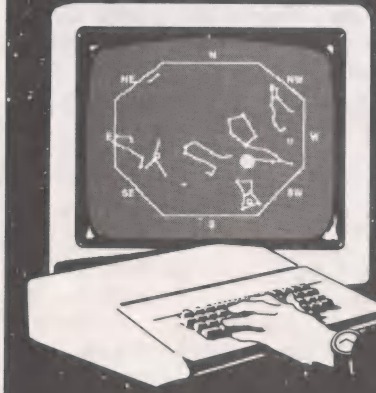

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SOFTWARE

A Directory of Software Directories

This list includes only software directories that catalogue the products of more than one vendor. Most individual vendors publish their own catalogues (see page 28 for vendor list).

Appleseed
Software Publications
6 South St.
Milford, NH 03055

Cost: Free

Lists software for Apple, TRS-80, Atari and PET microcomputers. Some of the packages are educational.

Educational Software Directory
Sterling Swift Publishing Company
P.O. Box 188
Manchaca, TX 78652

Cost: $11.95
9.95 for bulk sales to schools

For the Apple II. Contains information on educational software publishers; groups software by grade level; provides contact information. Catalogue is available from Sterling Swift or from some computer stores.

Educator's Handbook and Software Directory
Vital Information, Inc.
350 Union Station
Kansas City, MO 64108

Cost: $16.95

In addition to software listings for the Apple, contains special section of articles on using microcomputers in education. Software descriptions are categorized by subject area and grade level. Order through Vital Information, Inc.; also available at local Apple dealers as of the end of July.

Huntington Computing Catalogue
P.O. Box 787
Corcoran, CA 93212

Cost: Free

Programs primarily for the Apple, but starting to carry Atari, PET and TRS-80. Education section in regular catalogue; new, entirely educational catalogue due out in fall.

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International Microcomputer Software Directory
Imprint Software
420 South Howes St.
Fort Collins, CO 80521

Cost: $28.95

Lists 5,000 software packages. Those that are educational cover all subjects. Listings are cross-referenced by application, computer system and software house. Brochures on the directory are available.

K-12 Micro Media
P.O. Box 17
Valley Cottage, NY 10989

Cost: Free

Lists and describes 250 programs from 50 vendors for the Apple, TRS-80, PET and Atari computers. Programs listed by subject area: math, reading, language arts, science and computer literacy are some. Also includes book listings. Software can be ordered directly through the catalogue.

Marck, Inc.
280 Linden Drive
Branford, CT 06082

Cost: Free

Catalogue lists programs by computer (Apple, Atari, PET and TRS-80), subject area and publisher. Some of the subject areas include: language, reading, history, geography, math, science and data processing. Readers can order software directly from Marck.

Microcomputers Corporation Catalogue
P.O. Box 191
Rye, NY 10580

Cost: Free

Lists hundreds of programs of all types, including educational. Also lists a wide assortment of computer accessories.

Opportunities for Learning, Inc.
Dept. L-4
8950 Lurline Ave.
Chatsworth, CA 91311

Cost: Free

Lists educational software from the elementary through the college level for Apple, PET and TRS-80 computers. Listings by subject, and within subject areas, by grade. Fall addition will also cover Atari.

Purser's Atari Magazine
P.O. Box 466
El Dorado, CA 95623

Cost: $1.00 from Atari dealers
$4.00 (covers postage and handling) from Purser's

Lists over 200 programs. Some, though not many, are educational.

Purser's Magazine
P.O. Box 466
El Dorado, CA 95623

Cost: $6.00 (includes postage and handling

This old standby is changing format and is no longer available on a subscription basis. Current issue is a guide to computing, including articles on hardware and software as well as a listing of programs for the Apple and the TRS-80 that are suitable for *home* educational use.

Queue
5 Chapel Hill Drive
Fairfield, CT 06432

Cost: $8.95

Catalogues educational software available for Apple, Atari, PET and TRS-80 microcomputers. Covers 40-educational software publishers; programs grouped by subject and grade. Readers can order software directly from *Queue.*

School Microware Directory
Dresden Associates
Dept. CCN
P.O. Box 246
Dresden, ME 04342

Cost: $25/year for 1981-82 (includes the current full directory and three updates)

The September 1981 directory will list over 1,200 products and will include software for Grades K-12 in 60 subject areas.

Skarbeks Software Directory
11990 Dorsett Rd.
St. Louis, MO 63043

Cost: $11.95

Lists over 1000 programs, including an extensive list of educational software. Programs are listed alphabetically by title and indexed by subject. Educational programs for all subjects, K-12.

TRS-80 Software Directory
Radio Shack
1600 One Tandy Center
Fort Worth, TX 76102

Cost: $1.95

Directory of 2,000 programs produced by various vendors covers education; available from Radio Shack dealers.

VanLoves 1981 Apple II/III Software Directory
Vital Information, Inc.
350 Union Station
Kansas City, MO 64108

Cost: $19.95

Has an educational software section. Programs listed alphabetically and by subject; a vendor list is also provided.

EDUCATIONAL PROGRAMS
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see page 62 →

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Earth Science Series – for Jr. and Sr. High School (12 programs – TRS-80 Lev. 11, 16K, $68.50).

For free information write to:
TYC Software™
40 Stuyvesant Manor Dept. CN
Geneseo, NY 14454 716-243-3005

*Trademark of Apple Computer Inc.
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The MicroSIFT Model

by Donald C. Holznagel

As coordinator of MicroSIFT, a software evaluation clearinghouse at the Northwest Regional Educational Laboratory, Portland, Oregon, I frequently receive calls from educators who have bought microcomputers but can't find suitable software. Ideally, educators should examine their instructional needs and locate appropriate software *before* buying hardware. Often, however, schools originally purchased hardware for computer programming or computer literacy courses, neither of which demands much software. As personnel became excited about the computer's capabilities, they envisioned other instructional applications and the question arose, What software can I trust?

MicroSIFT can help educators answer this question in two ways: its own software evaluations will soon be available, and, further, educators can use MicroSIFT's evaluative considerations as a guide in assessing programs.

The MicroSIFT evaluation model is a consumer model; it assumes that a teacher, principal or other school employee needs information to support a decision to buy or not to buy. It further assumes that evaluations will be most credible if done by teachers familiar with the intended grade level and the subject of the software. Because educators' teaching styles and experiences differ, MicroSIFT evaluations combine and summarize evaluations by several people.

The criteria these reviewers use fall into three categories:

Content: Is the material accurate and educationally valuable? How biased is the subject matter?

Instructional Quality: What is the purpose or objective of the package? How well is it met? Presentation, motivation, creativity, feedback and learner control are other factors in this category.

Technical Quality: How effectively and fully are the microcomputer capabilities used? Is the design appropriate for nontechnical students and teachers? Is the program reliable?

In addition to detailed analysis of the above characteristics, a complete evaluation includes descriptive information such as hardware and software requirements, classification by subject level and mode of instruction, and instructional objectives and prerequisites. Also, since most software packages include printed material as well as computer programs, the entire package, not just the program, is evaluated.

For a more detailed account of MicroSIFT, see "MicroSIFT: National Network to Evaluate Software," by Phyllis Caputo, in Volume 1, No. 3 (January-February 1981) of *Classroom Computer News*. Also, write MicroSIFT, Northwest Regional Educational Laboratory, 710 Second Ave., S.W., Portland, OR 97204.

Donald C. Holznagel is coordinator of MicroSIFT.

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Educational Software Vendors

ACORN Software Products, Inc.
634 N. Carolina Ave., S.E.
Washington, D.C. 20003
202/544-4259

Foreign language programs for the TRS-80 Model I and Model III computers.

Activity Resources Inc.
P.O. Box 4875
Hayward, CA 94540
415/782-1300

Thirty-six programs for instruction and enrichment in basic math, Grades 4-6. For the TRS-80 and Apple II.

Addison-Wesley Publishing Company
2725 Sand Hill Rd.
Menlo Park, CA 94025
415/854-0300

Computer math games for Grades 1-9 and a computer graphing experiments package for high school students will be available this August. Both for the Apple II.

Apple-Cations
21650 W. Eleven Mile Rd.
Suite 103
Southfield, MI 48076
313/354-2559

English and math games for primary school children; study quizzes for Grades 4 through college. All for Apple.

Apple Computer Inc.
10260 Bandley Drive
Cupertino, CA 94017
408/996-1010

Elementary-level programs in math; elementary- and secondary-level tutorials on programming; an author language called *Shell Games* and the simulation game *Lemonade.*

Atari, Inc.
1272 Borregas Ave.
Sunnyvale, CA 94086
408/745-5069

Elementary, secondary and college level programs in history, sociology, physics, algebra, spelling, economics and other subjects.

Avant-Garde Creations
P.O. Box 30161
Eugene, OR 97403
503/345-3043

Complete CAI packages in mathematics, physics, chemistry, biology, English and German available for the Apple II.

Basics and Beyond Inc.
P.O. Box 10
Amawalk, NY 10501
914/962-2355

Math, spelling, geography, vocabulary and game programs for the TRS-80 Level II.

Bell & Howell
7100 N. McCormick Rd.
Chicago, IL 60645
312/262-1600

Genis I and PASS, two authoring languages.

Bluebird's Computer Software
2267 23rd St.
Wyandotte, MI 48192
313/285-4455

Typing programs, math/statistical packages and games for the TRS-80.

Borg-Warner Educational Systems
600 W. University Drive
Arlington Heights, IL 60004
800/323-7577
800/942-6995 (Illinois)

Publishes *Critical Reading,* an eight-disk computer-managed instruction system.

The Bottom Shelf
751 Dekalb Industrial Way
Atlanta, GA 30033
404/296-2003

A library of 100 programs for the TRS-80 sold as a package. Some are educational.

Brain Box
601 W. 26th St.
New York, NY 10003
212/989-3573

Fourth-grade through high-school programs in reading, English, social studies and American history for TRS-80 and Apple.

California Software
P.O. Box 275
El Cerrito, CA 94530
415/527-8717

Programs for teaching COBOL and ALGOL on the high school level. For any CP/M-based machine.

Charles Mann & Associates
55722 Santa Fe Trail
Yucca Valley, CA 92284
714/365-9718

Features management programs—scheduling, record keeping, grades, budgeting—as well as instructional programs about computers and programming for the Apple, Texas Instruments and TRS-80 computers.

Comm*Data Systems
P.O. Box 325
Milford, MI 48042
313/685-0113

Produces a once-a-month PET cassette with four elementary-level programs in the areas of math, geometry, English, logic and reading.

COMPress
A Division of Science Books International, Inc.
P.O. Box 102
Wentworth, NH 03282
603/764-5831

Problem solving and laboratory simulation programs in subjects such as energy, genetics, statistics, chemistry and evolution. High school and college level. For Apple II and Bell & Howell.

Compumax, Inc.
P.O. Box 1139
Palo Alto, CA 94301
415/321-2881

Currently has a lesson-writing system for the Atari 800. An Apple II version is forthcoming.

Computer Curriculum Corporation
P.O. Box 10080
Palo Alto, CA 94303
415/494-8450

Turnkey system in reading, language arts, math in all grade levels.

Computer Information Exchange
P.O. Box 159
San Luis Rey, CA 92068
714/757-4849

Upper elementary, high school and college programs in many subjects for the TRS-80 microcomputer.

Control Data Corporation
8100 34th Ave. South
P.O. Box O
Minneapolis, MN 55440
612/853-4541

PLATO time-sharing system run on CDC terminals.

Cook's Computer Company
1905 Bailey Drive
Marshalltown, IA 50158

Apple II programs in math, letter and number recognition for young children, art education, typing and spelling.

CourseWare Magazine
4919 North Millbrook #222
Fresno, CA 93726

A 5-times a year magazine of educational software on cassette. PET, Apple and TRS-80 versions.

Creative Computing (Sensational Software)
P.O. Box 1139
Morristown, NJ 07960
800/631-8112

Forty-seven software packages, including the entire line from MECC and the Huntington Computer Project. For Apple, Atari and TRS-80 microcomputers.

Duxbury Systems, Inc.
56 Main St.
Maynard, MA 01754
617/897-8207

Micro Braille System. Translates normal print text into contracted (Grade II) braille. Software is sold along with appropriate hardware.

DYNACOMP, Inc.
1427 Monroe Ave.
Rochester, NY 14618
716/442-8960

Two programs for young children: *Teacher's PET* for counting, arithmetic and word-recognition, available for TRS-80, Apple, Atari, PET, Northstar and CP/M-based systems; *Hodge Podge,* hit any key for an "educational happening" on the screen. Apple only.

Education Programs
Disney Electronics
6153 Fairmont Ave.
San Diego, CA 92120
714/281-0285

Preschool alphabet drill; reading, language arts and math, Grades K-8. TRS-80; soon to be available for Apple.

Educational Activities, Inc.
1937 Grand Ave.
Baldwin, NY 11510
800/645-3739

Reading, spelling, language arts, classroom management and mathematics programs for the PET, TRS-80 Level II and Apple II Plus.

Educational Courseware
3 Nappa Lane
Les Port, CT 06880
203/227-1438

Apple Basic Tutor—tutorial disks in biology, world history, astronomy, physics, population studies and test forms for junior and senior high and college students.

Educational Services Management Corporation
P.O. Box 12599
Research Triangle Park, NC 27709
919/781-1500

Administrative and special-purpose software includes *Instruct II,* a computer-managed instruction system for the Apple. Will contract to develop software for individual client needs and machines.

Educational Software Midwest
414 Rosemere Lane
Maquoketa, IA 52060
319/652-2334

C-BITS, Computer-Based Individualized Testing System, allows teachers to construct multiple-choice, true-false and fill-in or matching tests. For Apple II and Bell & Howell computers.

Educational Software Professionals, Ltd.
38437 Grand River
Farmington Hills, MI 48018
313/477-4470

Grammar drills, retailing math, educational charades, chemistry and test-writing programs for the Apple II.

Edu-Soft Steketee Educational Software
4639 Spruce St.
Philadelphia, PA 19139
215/747-1284

Math programs for the Apple II and TRS-80.

Edutek Corp.
P.O. Box 11354
Palo Alto, CA 94306
415/325-9965

Reading and math game-oriented drills for preschool and elementary grades. For the Apple II computer.

Edu-Ware Services, Inc.
22222 Sherman Way
Suite 102
Canoga Park, CA 91303
213/346-6783

Software for the Apple II and Apple II Plus includes reading, math and programs that test eye-hand coordination, among others.

Entelek
P.O. Box 1303
Portsmouth, NH 03801
603/436-0439

Over 100 computer books and programs for Apple, TRS-80, PET and DEC computers. Math, science, graphics and computer language.

Gentech Corporation
4101 N. St. Joseph Ave.
Evansville, IN 47712
812/423-4200

Sells an interactive video system that includes both hardware and educational software.

Hartley Software
P.O. Box 431
Dimondale, MI 48821
616/942-8987

K-8 reading, language arts and math programs for the Apple II microcomputer.

Hayden Book Company, Inc.
50 Essex St.
Rochelle Park, NJ 07662
201/843-0550

Educational software in math.

High Technology Software Products Inc.
P.O. Box 14665
8001 N. Classen Blvd.
Oklahoma City, OK 73113
405/840-9900

Administrative packages and chemistry lab simulations for the Apple.

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Toronto, Ontario M5A-1L6
(416) 366-0226

DATELINE: Herkimer, New York

As surely as the earth revolves around the sun, computer programs offered through the Herkimer BOCES revolve around the planetarium. Gifted and talented fourth, fifth and sixth graders not only learn BASIC programming, but also experience a simulated flight to Mars.

In "Project Pegasus: Men to Mars," the young astronauts begin preparing for their trip by studying maps of Mars and viewing slides. By the time they man their model space shuttles (built out of wood and installed in the planetarium), they've practiced take-offs and landings with simulation programs on their PET computers. The simulations are realistic, stresses Planetarium Director Everett Q. Carr: the children must do everything right or they crash.

On the day of the flight, the children divide into two flight crews and a ground crew, the PET computers mounted in the space shuttles and at mission control center their only means of communication. The planetarium's special effects equipment provides the appropriate atmospherics as the studonauts launch into space.

When these space pioneers land, they'll be kept plenty busy. Director Carr and his wife, Claire J. Carr, are working on the second part of this odyssey: "Mars: 2014 A.D. Space Colonies." Students will colonize and explore the planet, searching for the natural resources growing scarce on Earth.

Most of us aren't fortunate enough to list planetariums among our instructional resources, but we can always wish for one on a star. And if the wish comes true—or even if it doesn't—the lesson plans for "Project Pegasus" ($7.95), plus the take-off and landing simulations ($15.95 each), are available through The Windelott Company, Drawer P, West Winfield, NY 13491.

Houghton Mifflin Co.
One Beacon St.
Boston, MA 02107
617/725-5000

The Answer, a turnkey hardware/software instructional management system. (See also, Time Share Corp.)

Information Unlimited
Software, Inc.
281 Arlington Ave.
Berkeley, CA 94707
415/525-9452

Word processing, data management, mailing programs and *Tellstar,* an educational astronomy program. All for the Apple computer.

Instant Software
Peterborough, NH 03458
603/924-7296

Apple elementary math materials.

Instructional Development
Systems
29 Virginia Beach Blvd.
Virginia Beach, CA 23452
804/340-1977

Multigrade AIDS software for the Apple.

J.L. Hammett Company, Inc.
Hammett Place
P.O. Box 545
Braintree, MA 02184
617/848-1000

All subject areas, K-12, for the TRS-80, Apple and PET microcomputers.

K-12 MicroMedia
P.O. Box 17
Valley Cottage, NY 10989
914/358-2582

Programs for the PET, Atari, Apple and TRS-80 (K-12) in math, language arts, reading, science, computer literacy, social studies and early childhood (from many software producers).

Krell Software
21 Milbrook Drive
Stony Brook, NY 11790
516/751-5139

SAT preparation programs for the TRS-80, PET and Apple computers.

Learning Tools Inc.
4 Washburn Place
Brookline, MA 02146
617/566-7585

Management systems for general and special education—a curriculum management system, a teacher planning system and an administrative planning system. Available for Apple, TRS-80, North Star, Commodore, Texas Instruments, Zenith and other computers.

Level IV Products Inc.
32461 School Craft
Livonia, MI 48150
313/525-6200

Typing, math, English; all grade levels. For Radio Shack TRS-80.

McGraw-Hill
1221 Ave. of the Americas
New York, NY 10020
212/997-6194

Two McGraw Hill divisions are developing software. The Greg Division has a computer literacy program for the Apple II that teaches problem solving with computers using the Pascal language; Webster Division is developing three packages for the TRS-80: the *Search Series* of programs in geology, history and civics for Grades 4-6, and *Introduction to Microcomputers* and a math skills package for Grades 4-8.

MECC Publications
2520 Broadway Drive
St. Paul, MN 55113
612/376-1118

Math, language arts, social studies and science for the Apple. All grade levels.

Med Systems Software
P.O. Box 2674
Chapel Hill, NC 27514
919/942-7949

Mathematical and money skills tutoring games for grade school children for the TRS-80.

MicroGnome
5843 Montgomery Rd.
Elkridge, MD 21227
301/796-2456

CAI authoring system for the TRS-80 that allows teachers without programming experience to create their own software. Also, *Mathematics in Energy* for Grades 8-9.

Micro Learningware
P.O. Box 2134
N. Mankato, MN 56001
507/625-2205

Over 80 programs for the TRS-80, Apple and PET computers. Grades 5-12 in math, spelling, history, science, business and geology.

Microphys Programs
2048 Ford St.
Brooklyn, NY 11229
212/646-0140

Administrative packages and over 180 programs in physics, chemistry, calculus, mathematics, vocabulary and spelling for the PET and Apple.

Microsoft Consumer
Products
400 108th Ave., N.E.
Bellevue, WA 98004
206/454-1315

Educational software for the Apple and TRS-80. Two products, *Typing Tutor* and *mu-Math,* for Grade 9 through college.

Milliken Publishing Co.
Computer Department
1100 Research Blvd.
St. Louis, MO 63132
314/991-4220

Math Sequences Package and a new language arts series (available September 1, 1981) for the Apple. All grade levels.

Milton-Bradley Co.
Shaker Rd.
E. Longmeadow, MA 01028
413/525-6411

Math and language arts programs for the middle elementary grades for use with Apple microcomputer; available late Fall 1981.

Monument Computer
Service
Village Data Center
P.O. Box 603
Joshua Tree, CA 92252
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Burbank, CA 91504
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Programs for Learning
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203/355-3452

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Quality Education Design
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Portland, OR 97212

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Radio Shack Education Division
1600 One Tandy Center
Fort Worth, TX 76102
817/390-3832

Math programs, elementary through secondary level. Language arts series for pre-school and early elementary that focuses on keyboard familiarization. Three authoring systems.

Random House
High School Division
2970 Brandywine Rd.
Suite 201
Atlanta, GA 30341

Math, reading, language arts and management systems for TRS-80 and Apple II. All grades.

Right On Programs
P.O. Box 977
Huntington, NY 11743

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Science Research Associates
155 North Wacker Drive
Chicago, IL 60606
800/621-0664
312/984-2000 (Illinois)

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SoftWare House, Inc.
695 East 10th North
Logan, UT 84321
800/453-2708

Math programs and games for Atari and Apple computers.

Solartek
P.O. Box 298
Guilderland, NY 12084

Solar energy game and solar home simulations for the TRS-80 Level II.

Sterling Swift Publishing Company
1600 Fortview Rd.
Austin, TX 78704
512/444-7570

Texts and workbooks for organizing classroom courses or segments of courses with software serving to reinforce the printed materials.

Teaching Tools: Microcomputer Services
P.O. Box 12679
Research Triangle Park, NC 27709
919/851-2374

Educational software for the PET in addition, subtraction, spelling, matching games, and letters and numbers programs for young children.

T.H.E.S.I.S.
P.O. Box 147
Garden City, MI 48135
313/595-4722

Word games, math practice, instructional games for Apple II, Atari.

3 R Software
P.O. Box 3115
Jamaica, NY 11431

An elementary and middle school language arts series (198 lessons) for TRS-80.

Time Share Corp.
Hanover, NH 03755
603/448-3838

Reading, math, language arts curriculum and management systems for elementary and middle grades. A guidance information system. (See also Houghton Mifflin Co.)

Transnet Corporation
1945 Route 22
Union, NJ 07083
201/688-7800

Sells Apple computers along with packaged programs.

TYC Software
40 Stuyvesant Manor
Genesco, NY 14454
716/243-3005

Spelling for elementary school, earth science for junior and senior high; test writing and management system for teachers. All TRS-80 Level II (cassettes only).

Tycom Associates
63 Velma Ave.
Pittsfield, MA 01201

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297 Elmwood Ave.
Providence, RI 02907
401/467-5600

Language/reading development program, K-college.

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Both systems require 48K Apple with Applesoft ROM and 1 disk drive.
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4040 Palos Verdes Drive North, Rolling Hills Estates, CA 90274 (213) 541-3377

MATHWARE™
Where Numbers Come Alive

Swapware from Softswap

by Ann Lathrop

For the price of a disk, postage and handling, you can increase your collection of educational software for the TRS-80, Commodore PET, Apple and Compucolor computers. Better yet, if you have a home-grown program you're willing to swap, you can receive a free disk of programs in return.

The *Softswap,* a joint project of the San Mateo County Office of Education, Redwood City, California, and Computer-Using Educators (CUE), has approximately 200 public domain programs available for exchange. The *Softswap's* focus on educational software makes it unusual among the many users' group libraries currently operating across the country, although The Texas Computer Education Association operates a software exchange for members, and The Tri-County Computer Consortium, which serves Oakland, Wayne and Macomb Intermediate School Districts in Michigan, has begun developing its own library of "swapware."

Most *Softswap* programs are short, stand-alone instructional units. Many are drill-and-practice exercises written for elementary school work or for remedial work at the secondary level; about one-fourth are math oriented. While the actual quality of the programs varies greatly, *Softswap's* goal is to distribute only programs that have educational value and which are as error free as possible.

Educators—primarily CUE volunteers—and paid student-aides who work in the Microcomputer Center that houses the *Softswap* evaluate and edit all donated programs. Each goes to at least two CUE members for review of its educational merit and programming soundness. Accepted programs are then edited for spelling errors, inaccurate or incomplete instructions, errors in factual content, programming errors and other problems. Finished programs go onto disks, each of which contains from five to 30 programs, all for one computer, but for various subjects and grade levels. Thirteen disks are currently available: five for the PET, three for the Apple, three for the TRS-80 and two for Compucolor. An Atari disk is in the making.

Softswap members try to assure that programs submitted are truly original creations of the author. If they discover that a donation is adapted from another program or from a book or journal, they request the original author's permission to publish the program. If a published program turns out to infringe on someone's copyright, it is removed from the collection.

As educators and their students become more sophisticated programmers, the software donated to *Softswap* is improving. The most interesting programs received do more than just put workbook pages and drill problems onto the computer screen; they challenge the student-user and make far better use of the unique capabilities of the computer. *Softswap* hopes to make more and more of these programs available free to educators who bring their own disks to the center, or for a nominal fee by mail. For further information, write: Ann Lathrop, Educational Resources Center Library, San Mateo County Office of Education, 333 Main St., Redwood City, CA 94063.

Ann Lathrop is library coordinator for the San Mateo County Office of Education, Redwood City, California, and coordinator of the Softswap.

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Lightening the Load with Computer-managed Instruction

by William D. Hedges

A computer-managed instruction system can be a teacher's best friend. Good computer-managed instruction (CMI) offers diagnosis, prescription, data collection and data reporting capabilities. In a typical system, the student signs on, types in the information requested, receives a 'prescription' of what to study and signs off to go do the assignment. This prescription might consist of chapters to read, problems to work, activities to perform, etc.

The computer is able (at least theoretically) to develop student prescriptions; typically, it accomplishes this by giving a pretest. The student may take the test at the computer console or record his answers on mark-sense cards that can be read by a mark-sense card reader. The computer scores the test and analyzes the results.

In some systems, the results are made immediately available to the student:

"You scored seven out of the ten problems right. This is not quite good enough. Please sign off and read the material on pages 155-160 of *Mathematics for Grade 3.* When you think you are ready, come back and take another test." The computer program stores a number of alternative assignments that are recommended according to the student's score. The student who scored 100, for example, might be advised to go on to a new topic or to contact the teacher. Unfortunately, in many cases, the test items are merely keyed to objectives derived from specific textbook materials. This means that prescription tends to boil down to the student's reading certain pages in a book and then taking another test.

Record Keeping

In more elaborate systems, the computer keeps a record of when and how often a student takes each test, the scores, the material covered, dates signed on and the like. It can average test scores, draw up bar graphs and print out pupil and class progress charts. The teacher or administrator can examine the data at any time.

Larger CMI systems, such as *The Answer,* sold by Houghton Mifflin Co., maintain records on up to 10,000 students and can serve large schools or even an entire district. Such systems run on minicomputers and cost upward of $40,000. Smaller systems, such as those offered by Evans Newton, Milliken or Science Research Associates, run on microcomputers and can serve the classroom or school level. Learning Tools, Inc., offers a versatile microcomputer-based system expressly designed to manage instruction for special needs students.

The reason such instruction is called computer-*managed* instruction is obvious. The computer actually does manage facets of the teaching process. Because such chores are a heavy burden for the teacher, computers promise to provide badly needed relief. In most CMI systems, as they currently operate, the teacher does the actual prescribing; the computer merely analyzes and reports data and suggests possibilities. This same approach is now being used in medicine: a physician can type in a patient's symptoms, and the computer suggests possible diagnoses the doctor might not have recalled on his own. Even when carefully developed, however, the danger of CMI is that it will be used even when the data base for prescriptions is obsolete, or that it will be used with children for whom it was not intended.

For information on CMI research, see *Computer-Managed Instruction* by Frank Baker, published by Educational Technology Publications, Englewood Cliffs, NJ 07632, in 1978. Innovative approaches are reported in journals such as *The Journal of Computer-Based Instruction,* published by the Association for the Development of Computer-Based Instructional Systems, Computer Center, Western Washington University, Bellingham, WA 98225.

William D. Hedges, a professor at the University of Florida, Gainsville, is a regional contributor for Classroom Computer News.

Good CMI Programs . . .

- are sensitive to the learning styles and needs of different children
- are erected on a clear conception of curriculum
- have a research base
- reflect excellent test construction
- give very clear directions for test taking or for furnishing other needed information
- are specifically—not just generally—diagnostic
- allow students to retake parallel tests to reach mastery level
- have tests that demand more than simple recall
- have tests that are clearly related to the content
- state the goals and objectives clearly
- keep careful individual and group records
- print out graphs of student progress for both student and teacher use

Some major producers of Computer-Managed Instruction Packages

Borg-Warner Educational Systems
600 W. University Drive
Arlington Heights, IL 60004
800/323-7577
800/942-6995 (Illinois)

Charles Mann & Associates
55722 Santa Fe Trail
Yucca Valley, CA 92284
714/365-9718

Control Data Corporation
8100 34th Ave. South
P.O. Box O
Minneapolis, MN 55440
612/853-4541

Evans Newton Incorporated
7335 East Acoma Drive
Suite 102
Scottsdale, AZ 85260
602/998-2777

Houghton Mifflin Co.
One Beacon St.
Boston, MA 02107
617/725-5000

Learning Tools, Inc.
4 Washburn Place
Brookline, MA 02146
617/566-7585

Milliken Publishing Co.
Computer Department
1100 Research Blvd.
St. Louis, MO 63132
314/991-4220

Science Research Associates
155 North Wacker Drive
Chicago, IL 60606
800/621-0664
312/984-2000 (Illinois)

A Software Writer's Checklist:
10 Steps to Better Teacher-made Software

by Terry C. Giffel

Writing good instructional software requires more than just sitting down at a terminal or a microcomputer and pounding keys. Preplanning is an essential element in creating good, effective software. A few minutes of preplanning can also save hours of programming time because it provides a better sense of *what* must be programmed. These steps will give you some guidelines for creating better instructional software through a planned approach.

1 **SPECIFY GOALS.** State in general terms what you intend to do. Will the program be a math lesson or a spelling lesson? A tutorial, simulation or drill-and-practice exercise?

2 **SPECIFY OBJECTIVES.** Be specific! What should the student be able to *do* to show mastery of the material? Should students be able to list, describe, add or discuss? What is the minimum acceptable level of performance? These objectives will be used later as reference points for testing.

3 **ANALYZE YOUR AUDIENCE.** What must they know to be successful in using the lesson? What do they like? What interests them? Answers to these questions will help you identify language and graphics that relate to your students.

4 **CONSTRUCT TEST ITEMS.** If you write test items at this point, you will be better able to write a program that helps students achieve the intended results. To paraphrase a statement in Robert Mager's book, *Preparing Instructional Objectives*, if you know where you are going, you'll know how to get there. (By the way, do those test items match your objectives?)

5 **DESIGN THE PROGRAM.** Now that you have a clear idea of where the program should go, outline the program. As you outline, you will begin to think about how to write specific parts, so make notes where possible. Identify those items that need graphics, and pay close attention to the items that may be tricky for students. Those sections must be *especially* clear in your presentation.

6 **EVALUATE.** Before you go further, ask yourself a very fundamental question: Is the computer the best way to present this information? If not, why are you using it? Use the computer to do the things it can do well and use other media—slides, filmstrips, motion pictures—in situations for which they are best suited. Your students will benefit most from the medium that is appropriate for the task.

7 **WRITE THE PROGRAM.** Assuming you've decided to use the computer, you are now ready to begin programming. Work from your outline and write the program in sections. Use plenty of remarks (REM statements) so that you can easily locate specific parts when debugging and be sure to leave enough available line numbers between program statements so that you can insert new lines later if necessary. Starting each new section of your outline with a new series of line numbers is another good idea; if the last program line for one section is 870, start the next section with 900 instead of 880.

8 **DEBUG AND TRY IT OUT.** Be sure the program works as you think it should, then have one or two students give it a trial run. You may find that they have trouble with things you thought were easy and vice versa. Make the necessary modifications before having other students use the program. Don't be afraid to do a second trial run if you still are unsure about something.

9 **DEVELOP SUPPORT MATERIAL.** If possible, use the program in conjunction with other materials. Books for review, experimental materials for observation, special models or other items should be ready for student use. Don't hesitate to use several media along with the computer software. Students (and teachers) can benefit form a multifaceted approach to a lesson.

10 **USE AND RE-EVALUATE.** Once students have begun to use the software, make periodic checks to determine whether they've mastered the material. Clear up misconceptions and, if necessary, make adjustments to the program and other support materials.

Books to Program By

Albrecht, Robert. *My Computer Likes Me When I Speak BASIC.* Dilithium Press, P.O. Box 92, Forest Grove, OR 97116.

Albrecht, Robert L., LeRoy Finkel and Jerald R. Brown. *BASIC.* John Wiley & Sons, Inc., 605 Third Ave., New York, NY 10016.

Chirlian, Paul M. *Beginning BASIC.* Dilithium Press, P.O. Box 92, Forest Grove, OR 97116.

Coan, James S. *Basic BASIC: An Introduction to Computer Programming.* Hayden Publishing Co., 50 Essex St., Rochelle Park, NJ 07662.

Dwyer, Thomas A. and Margot Critchfield. *BASIC and the Personal Computer.* Addison-Wesley Publishing Co., Inc., Jacob Way, Reading, MA 01867.

Dwyer, Thomas A. and Michael Kaufman. *Guided Tour of Computer Programming in BASIC.* Houghton Mifflin Co., One Beacon St., Boston, MA 02107.

Golden, Neal. *Computer Programming in the BASIC Language.* Harcourt Brace Jovanovich, 757 Third Ave., New York, NY 10017.

Moursund, David. *Basic Programming for Computer Literacy.* McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, NY 10020.

Nevison, John M. *Little Book of BASIC Style: How to Write a Program You Can Read.* Addison-Wesley Publishing Co., Inc., Jacob Way, Reading, MA 01867.

Waite, M. and M. Pardee. *BASIC Primer.* Howard W. Sams & Co., Inc., 4300 West 62nd St., Indianapolis, IN 46206.

Terry C. Giffel, Ph.D., is an associate professor at East Stroudsburg State College, East Stroudsburg, Pennsylvania.

$elling Your Software

by Peter Dublin

If you have a microcomputer and are hooked on writing programs for your students, you've probably bought commercially produced instructional software and thought, "I can write better software than that!" And you may be right.

So what do you do? Can you publish your programs yourself? Market them yourself? Can you find a publisher? Can you contract with a distributor? Ultimately, these are the questions you must ask, but a more fundamental question comes first.

IS IT REPLICABLE?

Many teachers create curriculum materials that are better for them than anything they can buy. Often, however, these materials are too personal, too situation-specific. They rely on the teacher who wrote them to teach them. The first question you must ask yourself if you wish to sell your own software is, Is it replicable? Can other teachers use it without my showing them how?

Often the answer is a simple no. If you understand that from the start, you'll save yourself a lot of aggravation and disappointment. If the answer is yes, it is usually a qualified yes. You will probably have to modify what you have done to make it appropriate for other teachers in other situations. And you will almost always have to spend as much time on the user documentation—a teacher's guide of some sort—as on the program itself.

CAN I SELL IT?

If you decide to sell your software, you should explore two general directions. First, you can look for a publisher. A number of educational publishers produce instructional software for microcomputers. You will have to send them a proposal, consisting of a terse explanation of your program and its educational goals and a programming sample; if they respond positively, they may ask for an appointment with you, to see a sample of the program, or both. If all goes well, they might offer you a fee, a royalty percentage or some of each. Remember: they are putting up the money and are usually quite choosy. They accept a tiny percentage of the unsolicited proposals they receive.

A second alternative is to contract with a distributor. Many more firms distribute than publish instructional software, and they are usually much smaller. Unlike publishers, distributors don't pay you to develop your product; they only sell it for you once you've finished it. This means that distributors usually pay less up-front money and are slightly more willing to take on a product. They almost always pay a royalty percentage to the author, one that is usually larger than what a publisher will pay. (Royalties can range from under five percent to as high as 20, though that high is rare.) The big question for you is, Can these small distributors sell software? Can they compete with major educational publishers in the educational marketplace? Unfortunately, the jury is still out on that question.

CAN I SELL IT MYSELF?

A third option is to publish and distribute your software yourself. If you have the money and time, this is a sure-fire way to insure publication. Publishing the software is not an expensive proposition, but it is time consuming. All the development work involves your time, and you will be working entirely on speculation. You had better love the work if you are going to publish software yourself. But at least the publishing part is inexpensive. Once you have a master disk or cassette, you can have duplicates made for between $2.50 and $5.00, depending on quantity. You will also incur some costs for printing the documentation and for packaging. These may be as low as for a single mimeographed sheet and a padded mailer or as high as for a sophisticated brochure and package design. Your pocketbook will decide.

Development and publication may be inexpensive, but distribution is not. Ads in computer and educational magazines, booths at workshops or conventions, all cost money. And you may spend more time distributing a product than you ever spent developing it. But you're doing it for yourself. You have to decide if it's worth it.

CAN I WORK WITH OTHERS?

A final alternative is to work with others. While many people who like to program prefer to work alone, some find that they can share the responsibility and work-load while creating a more powerful and useful program by working with a group.

Intentional Educations, Inc., is an example of such a group. If it accepts your initial application, it will help you create a publishing proposal. It will put you in touch with other teachers; it will provide the perspective of a curriculum specialist and of an experienced curriculum programmer. It can provide technical help with both programming and proposal-writing. And ultimately, such a group should be able to help find a publisher for your program.

Well, those are your options. A list of software vendors, many of whom are distributors, appears on page 28. That and the following list of publishers should help you start selling. Good luck!

Peter Dublin, a curriculum specialist and former teacher, is president of Intentional Educations, Inc., publisher of this magazine.

Software Publishers

The market for computer-based educational materials is growing. And although some publishers are looking for specific kinds of software, most are interested in your ideas.

If you want a publisher to examine your software, begin by sending a one- or two-page description of your program. Specify the kind of computer system it will run on, including information on the memory requirements and all peripherals needed to run the program—disk drives, speech synthesizers, etc. Specify the skill areas the program addresses and the age children the program's designed for. Describe the kind of program: CAI, tutorial, simulation, game, etc. And briefly, but with as much specific detail as possible, tell what the program does.

Addison-Wesley Publishing Company
2725 Sand Hill Rd.
Menlo Park, CA 94025
415/854-0300

Apple Computer Inc.
10260 Bandley Dr.
Cupertino, CA 95014
408/996-1010

Atari, Inc.
1272 Borregas Ave.
Sunnyvale, CA 94086
408/745-5069

Bell & Howell
7100 N. McCormick Rd.
Chicago, IL 60645
312/262-1600

Hayden Book Co.
50 Essex Street
Rochelle Park, NJ 07662
201/843-0550

Houghton Mifflin Company
One Beacon St.
Boston, MA 02107
617/725-5000

McGraw-Hill Book Co.
Webster Division
1221 Avenue of the Americas
New York, NY 10020
212/997-1221

Charles E. Merrill Publishing Co.
1300 Alum Creek Dr.
Columbus, OH 43216
614/258-8441

Milliken Publishing Company
1100 Research Blvd.
St. Louis, MO 63132
314/991-4220

Milton-Bradley Company
Shaker Rd.
East Longmeadow, MA 01028
413/525-6411

Radio Shack Education Division
1600 One Tandy Center
Fort Worth, TX 76102
817/390-3832

Random House
201 East 50th Street
New York, NY 10022
212/751-2600

Science Research Associates
155 North Wacker Dr.
Chicago, IL 60606
312/984-2000

Scholastic Magazines, Inc.
50 West 44th Street
New York, NY 10036
212/944-7700

Scott, Foresman & Company
1900 East Lake Ave.
Glenview, IL 60025
312/729-3000

Publications for Software Writers

Freelance Software Marketing: A Practical Guide to Selling and Licensing Proprietary Computer Software, by B. J. Korites, covers marketing, selling techniques, pricing, contracts, preparing user's manuals and other essentials of software marketing. Based on the author's own experiences, it is a guide to selling general computer software, but is applicable to the education market. Available from the same source is *The 1980 Software Writer's Market,* which lists 1800 places to sell software. Each volume sells for $28.50. Write: Kern Publications, 190 Duck Hill Rd., P.O. Box 1029, Duxbury, MA 02332.

DATELINE: Albany, Georgia

With the help of a computer, discovery learning—an instructional approach generally associated with the younger grades—can enliven the education of high school and college students. John C. Kelly, who teaches at Albany Junior College, has created a series of trigonometry programs for the Apple that use the computer's speed of presentation and graphics to create a "discovery environment" that increases students' motivation and retention and enhances their problem-solving skills. The specific goal of his six-unit project is to foster intuitive thinking about graphic representation.

The units are:

(1) Orientation and Free Discovery: Students acquaint themselves with the microcomputer system and the procedures for using the graphic programs. The initial free discovery period promotes the feeling that the computer is a versatile tool for investigating mathematical relationships.

(2) Exploratory and Observation Unit: Encourages students to observe the cause-and-effect relationship between particular parts of equations and their graphic representation. The student at this stage is fine-tuning discovery skills in order to form hypotheses that can be tested with the computer.

(3) Holistic Graphing Unit: Students begin sketching graphs from given equations. The goal is for students to visualize the graph of an equation quickly, without resorting to plotting individual points. The computer provides immediate feedback to enable the student to determine the correctness of the sketched graph.

(4) Problem Solving Graphics Unit: The student uses skills learned in the first three units to solve an interesting form of graphics problem. The program displays a graph and asks the student to figure its equation. The student gets as many guesses as necessary and full use of the computer graphics system.

(5) Identity Graphing Unit: This unit is designed to provide a visual way of interpreting and conceptualizing trigonometrical identities. Students use it to observe the graphic transformation of one side of an identity into the graph that represents the other.

(6) Introduction to Polar Coordinates: Students apply discovery skills learned in the previous five units to a different graphical representation of trigonometric functions.

The Hidden Cost of Copyright Infringement

by Cheryl Weiner

Imagine a salesperson for a major basal publisher standing before an audience of teachers and making the following offer:

"At no cost, we will provide an extra set of readers in case the original is damaged in use. Not only that, we'll replace the damaged book for a nominal fee."

Surprise and delight at the publisher's unexpected generosity rustle through the room.

Another scene. A group of teachers from different schools gets together to swap textbooks. One teacher suggests that since they have no money for instructional materials, they should photocopy the books and so expose students to each. "Too expensive," is the response. "But that's not the problem," says another teacher. "It's illegal to use the school machines for that kind of copying."

Juxtapose these scenes with another. A publisher who has protected microcomputer software against copying offers a back-up set of disks as well as replacement copies at cost. During the ensuing uproar, educators charge the publisher with victimizing schools by preventing teachers from copying materials. The rationale? Schools cannot afford to pay for multiple copies of software for their microcomputers. Moreover, copying software is easy and economical.

Unfortunately, copying software is also illegal. Yet because of its relative ease, few can resist the temptation of getting a copy for free. Copying software has become part of the mores of microcomputer use.

The Hidden Costs

What most consumers don't realize, however, is that the copy is really not free. It costs the developers and distributors money to produce and market that product, and they have to make money in return. If they don't, they either go out of the business or pass on the cost of lost sales by increasing their prices. Right now, many publishers can't risk losing revenues to copying and are staying out of this market until the problem is solved.

Several companies have come up with solutions, though each has hidden monetary or pedagogical costs. For example, both Atari and Texas Instruments encase their software in protective modules. The enclosed software is stored on a read-only memory chip, rather than on disk or tape, making copying the program very difficult.

> *Copying software is illegal, yet it has become part of the mores of microcomputer use.*

Since the modules are very expensive to manufacture, large volume sales are required to offset production costs. Although mass distribution lowers the price per module, it increases the need to appeal to a wide general audience, which often decreases the pedagogical value of the contents. Moreover, since special equipment was originally needed to write the programs (first written in a high-level language such as BASIC, programs must then be translated, or *compiled,* into machine language to be stored on the ROM chip, a process requiring special equipment), independent software writers and publishers could not easily create the large volume of educational software needed to make these machines viable in schools.

Licensing software is another solution. Science Research Associates (SRA) chose this route, particularly for disk-based programs. SRA requires purchasers to sign a contract stipulating that the purchaser will not copy the software. Since both contract and disk bear the same license number, SRA can trace illicit copies back to the original purchaser.

Although SRA staff claim that procedures related to signing the contracts have not added to the price of software, costs are associated with any distribution system, and the consumer eventually pays for them. However, these and other small additional costs are reasonable if copying stops and, as a result, prices are deflated across the industry. It is too early to tell what the effect of this process will be.

One thing is certain: if the problem of copying is not resolved, schools will suffer. Unfortunately, many educators feel that publishers and developers should solve the problem, yet they resent the solutions. Moreover, many go right on copying, even when that means buying special programs that unlock protected software or paying students to break the protection codes. Budget cuts and public need cannot justify these actions. Stealing is stealing, and copying software is a crime.

Dr. Cheryl Weiner is special projects director for Data Communications Magazine, *a McGraw-Hill publication. She has been studying the educational software industry for the last two years and is a former educator.*

LANGUAGES

A computer language is a particular variety of software that makes it easier for a human to talk to a computer. In computerdom everybody has his favorite language. But the jury is still out on the most appropriate language for education. BASIC, PILOT, Pascal and LOGO are all contenders, but the ultimate language for education may still be but a nagging thought in some brilliant programmer's mind. Here is an overview of some languages of our day.

BASIC
PASCAL
FORTRAN
FORTH
LISP

Jane E. Goldman

The Lowdown on Languages

A computer is made of steel, plastic, copper and silicon. A human is made of ideas, fears, hopes and dreams.

Computers are fast, unimaginative and tireless.

Humans are slow, creative and easily bored.

Computers usually do what you tell them to, while humans seldom do.

With such differences you wouldn't think that humans and computers would have much to say to one another, but such is not the case. More and more humans are trying to strike up conversation with computers, and everytime you blink the computers seem more articulate.

There are definitely communication problems between humans and computers, however. Human language is rich, versatile and ambiguous. And humans seldom say what they mean. Computer language is colorless, restrictive and explicit; and the very concept of "meaning" is a questionable part of computer mentation.

The trend in human-computer communication is to put more of the burden of communication on the computer—make computer languages more "natural" and computers more "transparent" to the user. A natural computer language resembles the user's normal mode of communication. A transparent computer helps solve the user's problem in such a way that the user is oblivious to the machine. Transparent computers with natural languages require a great deal of memory and processing power, but the cost of such hardware is dropping rapidly so this is becoming less of an obstacle.

Here is a primer on some common computer languages. It's presented without bias, beyond the observation that the best language is the one you know and have available on your machine.

LANGUAGES FOR TECHNICIANS

Machine language. In the beginning was machine language. It looked something like:

```
00011000
10100101
00100000
01100101
00100010
10000101
00100000
10100101
00100001
01100101
00100011
10000101
00100001
```

This program, which simply adds two numbers, is written in 6502 machine language—a language understood by Apple II, Atari, Commodore CBM and Ohio Scientific computers. To the computer, of course, each line of the program is a pattern of high and low voltages in a memory location. Lines two and three, for instance, tell the central processor to fetch the number stored at a particular memory location.

A human might use machine language to communicate with a computer for three reasons:

(1) He doesn't have a more "natural" language at hand.

(2) He's a masochist.

(3) He's writing a short program that must use minimum memory and execute as fast as possible.

Assembly language. It's easy to see how a mere mortal could bobble the 1's and 0's of machine language. But if a task is tedious, time consuming or exacting, why not give it to the computer?

Suppose we give each machine instruction a name that is mnemonically related to its function—like ADC (Add with Carry) for 01101001, or LDA (Load Accumulator) for 10101001 or STA (Store Accumulator) for 10000101. Further, suppose we give important memory locations functionally meaningful names instead of sticking with the mind-bending 16-digit binary numbers that the computer understands.

Finally, we use a computer program called an *assembler* to translate our mnemonics back to machine language instructions.

Here's the assembly language version of the machine language program presented earlier:

```
DPADD
CLC
LDA $20
ADC $22
STA $20
LDA $21
ADC $23
STA $21
```

Assembly language definitely makes life easier for the programmer, but it's not all tea and skittles either.

Operating systems. Ask the man on the street about the power of computers and likely he'll tell you about an electronic cabal to conquer the world. But a computer can't even read a key from its keyboard without a program to tell it how. Imagine your frustration if every time you wanted to create a spelling game on your computer you had to write finicky little routines to read the keyboard, display characters, or save or load programs. Bah! Humbug! Can't someone write a general-purpose program that will take care of these nasty details, you ask?

You have just articulated the need for an operating system—a program that helps the computer manage its resources, including memory, keyboard, display device, printer and mass storage device. An operating system is like a manager who takes care of the pain-in-the-neck details of running a useful program on a computer. Clearly, a well-designed operating system is a big step toward a friendlier computer.

LANGUAGES FOR EDUCATORS

BASIC. Until recently, BASIC was the only wheel in town for educators who wanted to use microcomputers. BASIC was developed in the mid-1960s at Dartmouth College by John G. Kemeny and Thomas E. Kurtz. One advantage of BASIC is that is doesn't require much computer memory to run.

A BASIC program for adding two numbers is as simple as:

```
10 PRINT 2 + 2
```

BASIC (Beginning All-purpose Symbolic Instruction Code) was designed to be easily taught and learned. The original Dartmouth BASIC was limited, but many manufacturers have modified and extended the language. An extended BASIC such as Radio Shack's Level II is a powerful language useful in many realms, but it does have limitations. The many dialects of BASIC are one of the limitations. It's also easy to write messy, unstructured programs in BASIC—programs that run but are hard for humans to follow or fix.

Still a third limitation is that BASIC offers limited ways of representing data. BASIC allows data to be stored in computer memory as a single variable (class size), as a list (student names) or as a table (grades for each student on each of four tests). Contemporary computer language theorists tell us that much richer ways of representing data in computer memory are available.

Pascal. Many people say that Pascal will replace BASIC. Others say not. Pascal was developed in Switzerland in 1970-'71 by Niklaus Wirth and was made popular at the University of California at San Diego. Pascal is a "structured" language, which means that it's hard for a programmer to write a poorly organized program in Pascal. You must follow the rules of good programming or the computer gets cross. Pascal also allows a rich variety of data representations—e.g., arrays, sets, records and files.

PILOT. PILOT is designed for a specific application—computer-assisted instruction. PILOT is a dream for writing programs that present information, look for user response from the keyboard and branch depending upon the user's input. But PILOT is not suited for programs that require extensive computation or data processing. Versions of PILOT are available for PET, Atari, Apple and TRS-80 microcomputers.

LANGUAGES WITH PROMISE

LOGO. LOGO, developed at the Massachusetts Institute of Technology by Seymour Papert and others, is designed to give youngsters control over computers rather than the other way around. Papert, who studied with Piaget, invested LOGO with a set of primitive commands and a syntax that are intuitively obvious to kids. LOGO allows the user to create procedures (short programs) out of the primitive commands, to name the procedures and then to call on them by name for use in other procedures as though they were commands. In essence, the user creates her own language to deal with the world as she sees it.

Papert says that young children learn to write interesting programs in LOGO with very little instruction, but that LOGO is powerful enough to interest sophisticated programmers.

Until recently, LOGO was unavailable as a commercial product, but Texas Instruments recently announced a version for its microcomputer, and an Apple II version may be released commercially, pending legal clarification of some copyright issues.

FORTH. FORTH was developed 10 years ago by Charles H. Moore. There are now active FORTH user groups and versions of FORTH for most microcomputers. Says programmer John James, "FORTH was developed for control applications (using the computer to run other machinery), data bases and general business. It is least useful for big number crunching jobs . . . . Unlike Pascal, FORTH gives the user complete access to the machine and does not try to guard the user against mistakes. But its modularity and other forms of error control allow production of remarkably bug-free application programs . . . ." FORTH is extensible (the user can invent new commands out of more primitive commands), uses little memory and produces programs that run almost as fast as those written in assembly language. FORTH is more for the technician than for the educator, but it bears watching.

C. C, developed at Bell Laboratories, is becoming popular with many programmers. Like Pascal, it is structured. Like assembly language or FORTH, it gives the programmer control of the internal processes of the machine. It is said to be easy to learn and powerful. Several versions are available for microcomputers.

If you write your programs in a high-level language such as C or FORTH, you'll find moving them from one computer to another easy—you can write them on a microcomputer and run them on a mainframe or vice-versa.

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LANGUAGES

Author Languages: Instruction Without Programming

by William J. Wagner

I'd like to learn BASIC so that I can write computer-assisted-instruction lessons for my class." This optimistic and common hope derives in part from enthusiastic interest, in part from naiveté about the complexities of software development, in part from frustration at the difficulty of finding appropriate software and in part from some microcomputer advertising that makes programming sound so easy.

But in a traditional course in BASIC, this fragile early excitement can easily be drowned in a sea of prime numbers, arrays, nested loops and sorts. Teachers should know something about programming, but they rarely have the time or the experience to do professional software development. They should be able to use their special knowledge about subject matter, pedagogy and kids, and avoid the intricacies (and the tedium) of programming. Author languages make this possible.

An author language is a program (just as BASIC and Pascal are programs) that can be used to build other programs that present text, ask questions, respond to various expected and unexpected responses, advance the student to the next question after a specified number of tries and keep score for the session.

Some author languages allow the teacher to include graphics, sound or even video segments in the lessons, some allow disk storage of student records, and a few can find the correct answer anywhere within the text of the student's response or can decode incorrectly spelled responses. Author languages available for microcomputers have an astounding range in price—from under $35 to over $15,000. Some of the major ones are:

GENIS I was produced by Bell & Howell for use with the Apple computer and sells for about $300. The teacher-author types in explanatory text and questions related to the text. For each question, the author can specify a set of correct answers and the responses the computer should give to them. The author can specify other answers if desired, with tailored responses for each. For example, if the question was, "Name the capital of Washington state," the author might anticipate the response, "Seattle," and could furnish the reply, "Seattle is the largest city in Washington, but not the capital." Any incorrect answer that began with the letters OL might elicit the response, "You seem to be thinking of the right city, but you are not spelling it correctly."

GENIS I is similar to author languages available for mainframe computers—e.g., COURSEWRITER for IBM and DECAL for Digital. Like them, it is an efficient curriculum tool for lessons that require lots of text in standard format.

SHELL GAMES is a cheaper package for the Apple (around $50), with fewer options. Lessons can be produced in three formats: true-false, multiple choice and matching (given two lists of words, the student tells which pairs go together). The author supplies questions or word lists, and SHELL GAMES takes care of producing lessons. Available from Apple dealers.

BLOCKS was produced by two cooperating Title IV-C projects in northern California. Also written for the Apple (Integer BASIC), it includes extensive use of graphics and color in the lessons. In designing the lesson, the author plans the format of each screen "page," deciding which images to choose from the hundreds available on 25 disks, locating them on the screen, labeling them if desired and positioning text in various sizes and colors. A graphics editor is available for constructing new images.

BLOCKS is being used in over 35 schools and colleges around the country. While the lessons it can produce seem most appropriate for younger children, the set of available images includes all 50 states, with or without the major river or capital shown, and a complete set of traffic signs. Obviously lessons for older students could be fashioned around these and other graphics.

At the California School for the Deaf, one of the original developers, BLOCKS is used in an intriguing way: as a final exercise for some units in their regular classes, students design and write lessons on the subject matter.

PILOT was the first author language available for microcomputers, and it continues to be actively used and developed. A true programming language that is more suited to producing dialogues than to number crunching, PILOT does not offer the structured formats of GENIS I, BLOCKS or SHELL GAMES, and so is more flexible but less easy to use. Versions of PILOT exist for all the popular microcomputers, including S100 machines. Some schools have used PILOT as a first programming language because it is easier to learn than BASIC and because students can quickly produce interesting programs, containing, in the case of the Apple and Atari versions, sophisticated graphics. Radio Shack has recently announced a PILOT, and various PET PILOTs exist.

PASS (Professional Authoring Software System) is the top of the line of microcomputer author languages. Bell & Howell has put many sophisticated features (video capabilities, full Apple graphics, complete management and reporting features, etc.) into PASS, so that users can create lessons as sophisticated as those available on Control Data's PLATO. PASS lessons can be run on an ordinary Apple, and so are marketable. The remarkable price of a PASS license gives an indication of the system's complexity: $15,000 for the first year and $5000 annually thereafter.

CAIWARE, an author language for the TRS-80, allows teachers to write and administer true-false, multiple choice and completion-type lessons. The system also includes a management component: it tabulates a student's scores and, if the student scores high enough in a particular area, it automatically skips to a more advanced lesson. Similarly, the program can return to more elementary lessons as needed. CAIWARE is produced by MicroGnome, a division of Fireside Computing, and sells for under $30.

C.A.T.I. (Computer-Assisted Television Instruction) is a new area of computer instruction in which television segments can be incorporated into the lessons. An author language for producing these lessons is available for about $900, including interface between the Apple and a video tape recorder, from Whitney Educational Services.

GROW allows students to contribute to existing lessons, adding choices, comments or even new questions and text. The result can be an organic record of the opinions, feelings and knowledge of a group.

Two other inexpensive author languages are CODES (under $35, including manuals, for cassette versions for Apple, PET and TRS-80), and EDUGRAMMAR for the Atari.

William J. Wagner is coordinator of computer education, Santa Clara County, California. He is also a regional contributor for Classroom Computer News.

For More Information on Author Languages—

CODES: Academic Computing Association, P.O. Box 27561, Phoenix, AZ 85061.

GENIS I and PASS: Bell & Howell, Audio Visual Products Division, 7100 N. McCormick Rd., Chicago, IL 60645.

BLOCKS is available from: Computer-Using Educators *Softswap* (Fall of 1981), San Mateo County Office of Education, 333 Main St., Redwood City, CA 94063.

Training in the use of BLOCKS is available from the following people, who also can supply the software: Margaret Irwin, California School for the Deaf, 39350 Gallaudet, Fremont, CA 94538, or Ted Perry, San Juan Unified School District, 6141 Sutter Ave., Carmichael, CA 95608.

GROW: Computer Systems Design Group, 3632 Governor Dr., San Diego, CA 92122.

CAIWARE: MicroGnome, Fireside Computing Inc., 5843 Montgomery Rd., Elkridge, MD 21227.

PILOT: From Apple, Atari or Radio Shack dealers, or (for other microcomputers) from George Gerhold, 2445 N. Nugent, Lummi Island, WA 98262.

An inexpensive version of PILOT for the Apple is available from Cook's Computer Co., 1905 Bailey Dr., Marshalltown, IA 50158.

C.A.T.I.: Whitney Education Services (Computer-assisted television instruction), 2701 10th Ave., San Francisco, CA 94116.

EDUGRAMMAR: Roklan Corporation, 10600 W. Higgins Rd., Suite 200-I, Rosemont, IL 60018.

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Parlez-Vous PILOT?

Sprechen Sie BASIC?

Deciding Which Language is Best for You

by William D. Hedges

The plethora of programming languages is bound to bewilder any beginning programmer. But just as a jeep can do things a racing car can't and vice versa, so each computer language is designed for particular tasks. Applesoft BASIC and APPLE PILOT represent the two types of languages most commonly used in undergraduate computing: virtually all microcomputers use some version of BASIC; PILOT is an excellent example of computer-assisted instruction languages. How to choose between them? The following criteria should help you avoid looking up from your CRT to discover, as I did, that you've spent dozens of hours on the "wrong" language.

Criterion 1: What Do I Want the Language to Do for Me?

Perhaps you want a language that will enable you to produce short lessons as quickly as possible. You do not want or plan to become a professional programmer. If so, APPLE PILOT, which is constructed specifically for computer-aided instruction, is for you. You can begin designing your lessons immediately and master the language as you go.

The following program, in APPLE PILOT and BASIC versions, illustrates some of the differences between the two languages. The program lets a student type in two numbers and add them. The student can choose the problem, think about the answer as long as he or she wishes, enter it and immediately receive a score.

In APPLE PILOT:

```
T: ADDITION PRACTICE PROGRAM
*START
T:
T: TYPE ANY NUMBER
T:
A: #N
T: TYPE IN ANY OTHER NUMBER
T:
A: #M
C: S=M+N
T: WHAT ARE #N + #M ?
T:
A: #A
T(A=S):TERRIFIC!
T(A<>S):NO, NO, NO. THE ANSWER IS #S
T: WANT ANOTHER (YES OR NO?)
T:
M: YES!Y!YEAH
JY: START
TN:OK . . . . . SO LONG.
*END
```

In Applesoft BASIC:

```
10 PRINT "ADDITION PRACTICE
   PROGRAM"
15 PRINT
20 PRINT "TYPE IN TWO NUMBERS
   SEPARATED BY A COMMA."
30 INPUT M,N
35 S= M+N
40 PRINT
45 PRINT "WHAT ARE ";M;" + ";N;"?"
50 PRINT
55 INPUT A
60 IF A = S THEN GOTO 90
70 PRINT "NO, NO, NO . . . . THE
   ANSWER IS " ;S
80 GOTO 100
90 PRINT "TERRIFIC!!"
95 PRINT
100 PRINT "WANT ANOTHER (YES OR
   NO)?"
110 INPUT Y$
120 IF Y$="YES" THEN GOTO 20
130 PRINT "O.K. . . . . . SO LONG."
140 END
```

The PILOT program has commands such as T for type, A for answer, C for calculate, M for match, J for jump, JY for jump if answer is right and JN for jump somewhere else if answer is wrong, # for number and so on. It closely resembles English.

The BASIC language commands are somewhat less like English: PRINT, INPUT, IF THEN, GOTO. Both programs are straightforward; both, in this instance, are about the same length. However, the BASIC is somewhat more difficult to learn. (I should stress, in fairness to BASIC, that it is much easier to learn than the typical computer language, which probably accounts for its popularity.)

But perhaps you're in no hurry to produce lessons. You want the most powerful language and, further, want to understand what is going on inside the computer as much as possible. You are interested not only in lesson design, but also in such areas as mathematical computing.

In this case, BASIC is probably your language. PILOT can do most of what BASIC can, but it is an additional step removed from what actually goes on inside the computer. Also, since PILOT is designed specifically for computer-assisted instruction, it is awkward and inefficient for many other uses. For example, suppose you wanted to produce the multiplication tables up through the tens and ultimately print them out for student use. In BASIC your program would be as follows:

```
5 FOR N = 0 TO 10
15 FOR D = 0 TO 10
20 PRINT N;" TIMES ";D;" = ";N*D
30 NEXT D
40 NEXT N
50 END
```

In PILOT it would be:

```
*START
C:N=0
C:D=0
*AGAIN
C:P=N*D
T:#P
C:D=D+1
T(D  10):
JC:NEXT
J:AGAIN
*NEXT
C:N=N+1
C:D=0
T(CN  10):
JC:STOP
J:AGAIN
*STOP
```

Obviously, the PILOT version is much longer. In addition, the BASIC program produced the tables in four seconds, while the PILOT required almost three minutes. This leads to the next criterion.

Criterion 2: Speed

You pay in speed for what you gain in ease of learning and using a language. While you are almost immediately writing interactive, conversational programs with PILOT, you are also waiting for disk drives to clack and whirr and pick up and deliver text or graphics. This is true when you're writing or debugging a program and when your students are using it. While this slowness might seem unimportant initially, as you become more skilled, the waiting becomes irritating.

The closer your commands are to machine instructions, the faster your program runs. At one end of the spectrum are languages that work with all zeros and ones; at the other end are those like PILOT, with commands such as T for type. Since the computer doesn't understand these, it must translate them before it can react. When its work is done, it must translate the information generated back into English so that you can understand. This takes time.

Criterion 3: Power

Though some may disagree, I find PILOT able to do almost anything BASIC can; it just takes longer. In addition, APPLE PILOT is equipped with graphics capabilities. To create graphics with BASIC requires much more sophistication than with PILOT. For example, in the following program, you type in your name and the computer prints it out backward. While this is a trivial example, it illustrates several difficult concepts in BASIC:

```
10 INPUT "TYPE YOUR NAME";N$
20 FOR T = LEN(N$) TO 1 STEP -1
30 R$=R$+(MID$(N$,T,1))
40 NEXT T
50 PRINT R$
60 GOTO 10
```

Criterion 4: Lesson Design

Here indeed is a distinct advantage for PILOT—for the beginner. The PILOT manual is extremely helpful in both stressing the importance of and giving hints on designing lessons in advance. Of course, design is equally important in BASIC. However, since people who learn BASIC have interests ranging from problem solving to game production to CAI, manuals and introductory courses in BASIC rarely include instruction on designing lessons.

As an instructor of both CAI and BASIC, I find the emphasis of students taking the two courses different, and understandably so. In fact, I'm willing to conjecture that the relatively limited amount of good educational software derives in part from the fact that most good BASIC programmers have neither the interest nor the background to design sound curriculum materials.

Thus, if your primary interest is creating short, simple, practical, well-designed lessons, by all means go the PILOT route. The language is so easy, you will be able to concentrate on *design* of the lessons. PILOT is also quite powerful, enabling you to write more complicated programs if desired.

Criterion 5: Flexibility

BASIC wins hands down. If you master one version of BASIC, such as Applesoft or Integer, you can master other versions with relative ease. A few of the commands are different, but books such as *The BASIC Handbook* by David Allen, published by CompuSoft, help with translation problems. And as mentioned earlier, BASIC is appropriate for a bevy of programming tasks. APPLE PILOT, by contrast, is a *dedicated* language—it is designed to do one job only. Many other CAI languages exist, and I suspect that what I've said here about PILOT applies as well to these.

In summary, your professional needs provide the answer to the language question. Learning a computer language, like learning chess or bridge, is a never-ending process. The master of BASIC becomes dissatisfied and wants to turn to assembly or machine language, or switch to Pascal. Perhaps if you start with PILOT, BASIC will be your next step.

I am convinced, however, that thousands of educators have neither the inclination nor the need to spend hundreds of hours mastering the intricacies of microcomputers. For these fine folk, going down the road with a computer-assisted-instruction language is just right.

William D. Hedges, a professor at the University of Florida, Gainsville, is a regional contributor for Classroom Computer News.

SS says,
". . .be computer confident."

see page 62 →

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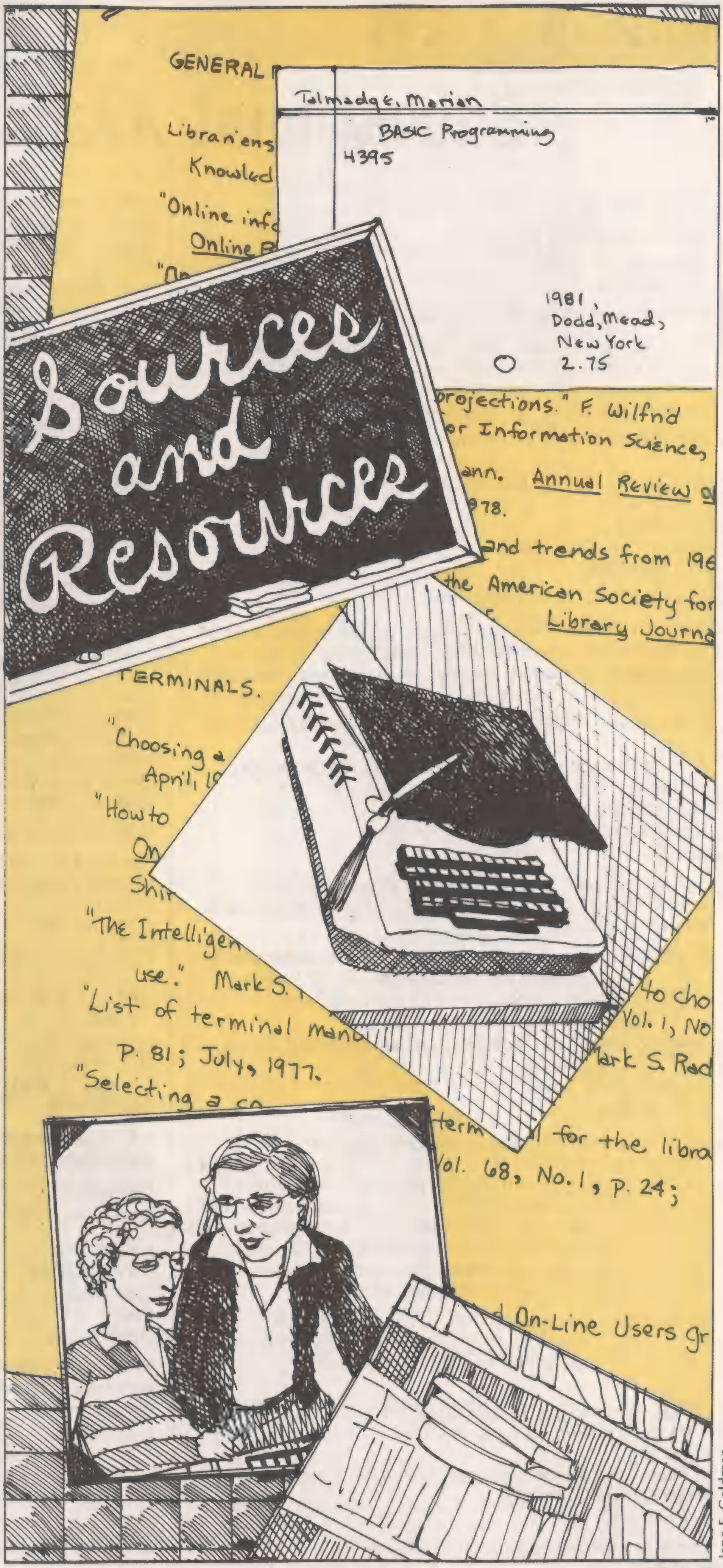
RESOURCES

It's nice to know that you have a knowledgeable friend when you're just getting started with computers. This section is chock full of possibilities for many a rich and rewarding relationship.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Jane E. Goldman

Educational Associations

AMERICAN ASSOCIATION OF SCHOOL ADMINISTRATORS (AASA)
1801 North Moore Street
Arlington, VA 22209
703/528-0700

Contact: William Spady, Executive Director

The AASA publication, *The School Administrator*, had a special section on new technologies several issues ago. Plans have been made to include computer topics in the summer and winter national conferences.

Publication: *The School Administrator*

ASSOCIATION FOR EDUCATIONAL DATA SYSTEMS (AEDS)
1201 16th St., N.W.
Washington, D.C. 20036
202/833-4100

Contact: Shirley Easterwood

AEDS serves educators and data processing professionals at all levels of education. It's traditional concern is with administrative information systems, but it has branched out to include microcomputers and instructional applications.

Publications: *AEDS Bulletin, AEDS Monitor, AEDS Journal*

AMERICAN EDUCATIONAL RESEARCH ASSOCIATION (AERA)
1126 16th St., N.W.
Washington, D.C. 20046
202/223-9845

AERA, an organization of university researchers, has a special-interest group for members interested in computer-assisted instruction.

Publications: *Educational Researcher, Educational Evaluation and Policy, American Educational Research Journal, Review of Educational Research*

ASSOCIATION FOR COMPUTING MACHINERY (ACM)
1133 Avenue of the Americas
New York, NY 10036
212/265-6300

ACM supports both local chapters in cities around the country and special-interest groups. Special-interest groups include: computers and society, personal computing, computer science education, small computing systems and applications, computer use in education, microprogramming and the ACM Elementary and Secondary Schools Subcommittee. The New York office can provide information on all of these and on the local chapters.

Publications: *Communications, Computing Reviews, The ACM Guide to Computer Science and Computer Applications Literature*

ASSOCIATION FOR THE DEVELOPMENT OF COMPUTER-BASED INSTRUCTIONAL SYSTEMS (ADCIS)
Bond Hall
Western Washington University Computer Center
Bellingham, WA 98225
206/676-2860

Contact: Joan Hayes, Secretary-Treasurer

ADCIS membership includes elementary and secondary school systems, colleges, universities, businesses and government agencies. The association's purpose is to advance the use of computer-based instruction and/or management by facilitating communication between product developers and users. Numerous special-interest groups.

Publications: *The Journal of Computer-Based Instruction, ADCIS Newsletter*

ASSOCIATION FOR EDUCATIONAL COMMUNICATIONS AND TECHNOLOGY (AECT)
1126 16th St., N.W.
Washington, D.C. 20036
202/833-4180

AECT, an organization of media professionals, seeks to improve learning through the effective use of media and technology. Its national convention in May 1982 will feature workshops and exhibits on microcomputers. It also supports a special task force on microcomputers.

Publications: *Educational Communication and Technology Journal, Journal of Instructional Development, Instructional Innovator*

INTERNATIONAL COUNCIL FOR COMPUTERS IN EDUCATION (ICCE)
Department of Computer and Information Science
University of Oregon
Eugene, OR 97403

Contact: David Moursund, Chairperson

The ICCE is a professional organization for people interested in instructional use of computers at the precollege level. It has 4,500 individual members and 10 organizational members.

Publication: *The Computing Teacher*

LIBRARY AND INFORMATION TECHNOLOGY ASSOCIATION (LITA)
American Library Association
50 E. Huron St.
Chicago, IL 60611
312/944-6780

LITA is concerned with library automation, educational technology, and video and cable communications.

Publications: *Journal of Library Automation, The LITA Newsletter*

NATIONAL ASSOCIATION OF SECONDARY SCHOOL PRINCIPALS (NASSP)
1904 Association Drive
Reston, VA 22091
703/860-0200

NASSP conducts institutes on computers in education and features articles in its professional journal on educational computing.

Publications: *NASSP Bulletin, The Practitioner, Legal Memorandum, Curriculum Report, NASSP Newsleader*

NATIONAL COUNCIL OF SOCIAL STUDIES (NCSS)
3615 Wisconsin Ave., N.W.

Washington, D.C. 20016
202/966-7840

NCSS's journal carries articles on computers in education. Member Richard A. Diem (Division of Education, University of Texas, San Antonio, TX 78285) is preparing a booklet called *Computers in the Social Science Classroom* as part of the council's "How to Do It" series.

Publication: *Social Education*

NATIONAL COUNCIL OF TEACHERS OF ENGLISH (NCTE)
111 Kenyon Rd.
Urbana, IL 61801
217/328-3870

Contact: Robert Squires, President
John Warren Stewig, President-Elect

NCTE has a committee on instructional technology that is establishing guidelines for developing computer materials in the language arts.

Publications: *Language Arts, College English, English Journal*

NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS (NCTM)
1906 Association Drive
Reston, VA 22091
703/620-9840

Contact: James Gates, Executive Director

NCTM has adopted a position statement giving full support to computers in the classroom at all levels and has published guidelines for software evaluation. One of its publications, *Mathematics Teacher*, is seeking software reviews.

Publications: *Arithmetic Teacher, Mathematics Teacher, Journal for Research in Mathematics Education, Mathematics Student, NCTM Newsletter*

NATIONAL SCIENCE TEACHERS ASSOCIATION (NSTA)
1742 Connecticut Ave., N.W.
Washington, D.C. 20009
202/328-5840

Contact: John M. Fowler, Director of Special Projects

All NSTA journals are seeking articles on small computers in teaching. Two current projects include developing software for energy and interdisciplinary education. Members are secondary school science educators.

Publications: *Science and Children, The Science Teacher, Journal of College Science Teaching*

SOCIETY FOR APPLIED LEARNING TECHNOLOGY (SALT)
50 Culpeper St.
Warrenton, VA 22186
703/347-0055

SALT serves primarily industrial trainers and the government, but it is a good source of information on advanced technological innovations.

Publications: *Journal of Educational Technology Systems, SALT Newsletter*

SOCIETY OF DATA EDUCATORS
983 Fairmeadow Rd.
Memphis, TN 38117
901/761-0727

Contact: Dana H. Verry, Executive Director

This society serves teachers and librarians who are interested in data education. The society's objective is to promote data education and to provide continuing education for data processing educators.

Publication: *Journal of Data Education*

DATELINE: Brookline, Massachusetts

Teachers at the Park School wanted their students to feel in control of computers, and so decided that each child's first experience with the machines would be as a programmer.

Problem: children below Grades 6 or 7 were uncomfortable with BASIC.

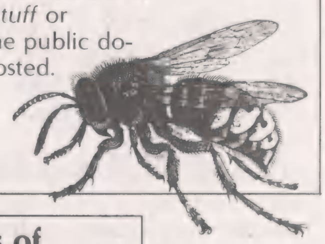
Solution: write a language for them.

That's just what math teacher Thomas R. Smith did. He developed *Kidstuff*, a programming language that runs on an 8K PET and is appropriate for elementary and junior high schoolers. Smith reports that *Kidstuff* also helps teachers better understand computers.

In developing *Kidstuff*, Smith strove for a language easy to learn but difficult to master. He also sought to mimic many features of BASIC, since the next logical step for his young programmers would be to learn BASIC. (Command statements, for instance, are often one-letter abbreviations of BASIC commands—R for RUN, S for STOP, etc.)

Kidstuff allows the user to draw a desired figure on the screen by programming the movements of a "fly speck." The fly can draw (move forward and leave behind a trail of *'s), jump (move forward without drawing) and turn in place 90 degrees. In addition to the programming statements that move the fly, others establish or change the value of variables, create loops, branch or designate subroutines.

Smith hasn't yet decided whether to find a publisher for *Kidstuff* or whether to place it in the public domain. We'll keep you posted.



Free Copies of Purser's Magazine

Robert Purser will provide up to 40 free copies of *Purser's Magazine*, issue no. 12, to anyone offering a course on microcomputers for teachers. The issue contains "A Guide to Computers." When ordering, please specify the dates of the class and the number of teachers attending. The magazines will be shipped library rate, so they must be shipped to a school, library or museum in the U.S.A. Allow plenty of time for delivery. This offer is valid until December 1981 as long as *Purser's* is able to fund this public service project. Write to: Robert Purser, P.O. Box 466, El Dorado, CA 95623.

User Groups for Educators

If you want a HUG or an Apple P.I.E., to go forth with your fellow FORTH programmers or to confer with other ZX-80 enthusiasts, chances are a user group somewhere will meet your desire. (HUG, in case you're wondering, is the Heathkit Users Group and Apple P.I.E. is the Apple Program Information Exchange.) Every machine, every special interest, every state has its user groups—supportive clubs through which like-minded computerists can share programs, problems and information. Here's a list of the major educational computing user groups.

APPLE FOR THE TEACHER
c/o Ted Perry
5848 Riddio St.
Citrus Heights, CA 95610

Apple for the Teacher operates the National Computer-Assisted Instruction Library for the Apple, which has software contributed from all over the world. The group's newsletter reviews educational software and provides recent information on educational computing grants and research.

THE BOSTON COMPUTER SOCIETY
Educational Resource Exchange
Three Center Plaza
Boston, MA 02108
617/367-8080

Contact: Bonnie Turrentine
Beth Lowd

The Boston Computer Society newsletter, *The Boston Computer Update*, publishes a column on educational computing. In addition, BCS's Educational Resource Exchange provides information on funding, teacher training, equipment selection and software availability.

COMPUTER-USING EDUCATORS (CUE)
c/o W. Don McKell
Independence High School
1776 Educational Park Drive
San Jose, CA 95133

CUE is a California-based association with members from around the country. Its activities include: a bimonthly newsletter, two major conferences a year, a microcomputer demonstration center and software library, and in-service training provided in conjunction with San Jose State University. It also helps other educational organizations set up computer workshops for their conferences.

COMPUTER-USING EDUCATORS OF BRITISH COLUMBIA
3264 St. Georges Ave.
North Vancouver, B.C. V7N 1V3
Canada

CUE of British Columbia is a newly formed user group. It is a branch of the British Columbia Teachers' Federation, but it welcomes associate members from other locations. It sponsors symposiums, conducts research and publishes a newsletter.

EDUCOM
P.O. Box 364
Princeton, NJ 08540
609/734-1915

EDUCOM serves colleges and universities throughout the country. Its overall purpose is to promote more effective use of computers and other technology in higher education, particularly through resource sharing. Special services include EDUNET, a network serving 168 institutions, and EDUCOM Consulting Group. EDUCOM produces three publications.

EDUSIG
Digital Equipment Company Users Group
One Iron Way
Marlboro, MA 01752
617/467-5111

EDUSIG is the education special-interest group for users of Digital equipment. Digital publishes an educational magazine called *EDU* three times a year and invites educators to contribute materials.

ELECTRONIC DATA PROCESSING/SPECIAL INTEREST GROUP
c/o Roger Sullivan
Education Department
Commercial Union Assurance Companies
One Beacon St.
Boston, MA 02108

Originally a special interest group within the American Society of Training and Development (ASTD), EDP/SIG has expanded its services to all data educators. It produces a bimonthly newsletter, resource references and handouts, and conducts seminars.

MICHIGAN ASSOCIATION FOR COMPUTER USERS IN LEARNING (MACUL)
c/o Wayne County Intermediate School District
33500 Van Born Rd.
Wayne, MI 48184
313/326-9300

Contact: Larry Smith

MACUL sponsors yearly state-wide and regional conferences. In addition, it has collected nine diskettes of public domain, educational software for the Apple. These are available for $9.00 by mail; they can also be copied free at MACUL conferences. The group is interested in acquiring similar software for Radio Shack, Atari and other microcomputers. The *MACUL Journal* has reviewed over 100 programs; the next issue will review another 130

NORTHWEST COUNCIL FOR COMPUTERS IN EDUCATION
Computer Center
Eastern Oregon State College
La Grande, OR 97850
503/963-2171

Contact: Jean Rogers

This group serves educators from Oregon and Washington primarily. It sponsors meetings, workshops and an annual conference.

TEXAS COMPUTER EDUCATION ASSOCIATION
7131 Midbury
Dallas, TX 75230
214/361-9472

The group encourages interest in K-12 computer education, provides information on current trends, promotes professional cooperation and communication, provides liaisons with other computer organizations and works to improve teacher training. It supports a software exchange, conferences and a quarterly newsletter.

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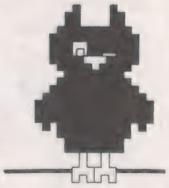

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A Bibliography of Bibliographies

The following bibliographies on educational computing are available through the ERIC system:

Beard, Marian. *Computer-Assisted Instruction: The Best of ERIC, 1973-May 1976.* Stanford University, California: ERIC Clearinghouse on Information Resources, August 1976.

This bibliography contains annotations of reports and other documents on computer-based instruction derived from a search of the Educational Resources Information Center (ERIC) system.

Hall, Keith A. *Computer-Based Education: The Best of ERIC, June 1976-August 1980.* Syracuse, New York: ERIC Clearinghouse on Information Resources, November 1980.

This is an update of an earlier ERIC bibliography and covers the period June 1976 to August 1980. Some subject headings include: historical references, new technology, new audiences, content area applications, developmental efforts, teacher training, research and conference proceedings.

Hinton, John R. *Individualized Learning Using Microcomputer CAI.* Aptos, California: Cabrillo College, March 1980.

This is a review of the literature on individualized instruction entered in ERIC between November 1978 and October 1979.

Rushby, N. J. *Computer-Based Learning in Europe: A Bibliography.* London, England: Imperial College, January 1978.

This bibliography lists 172 references on computer-assisted learning in Europe.

The following are articles and books that contain bibliographies on educational computing:

Barth, Rodney J. "ERIC/RCS Report: An Annotated Bibliography of Readings for the Computer Novice and English Teacher." *English Journal.* Vol. 68, No. 1 (January 1979), pp. 88-92.

This report indexes 26 documents in the ERIC system dealing with computer applications in high school English.

"Computers in Education." The National Council of Teachers of Mathematics, 1906 Association Drive, Reston, VA 22091.

The National Council of Teachers of Mathematics publishes a bibliography of articles about computers in education that have appeared in their publications, *The Arithmetic Teacher* and *The Mathematics Teacher,* for the past four years. The bibliography also lists some publications from other organizations. Single copies are available free of charge by writing NCTM.

Friel, Susan and Nancy Roberts. "Computer Literacy Bibliography." *Creative Computing.* Vol. 6, No. 9 (September 1980), pp. 92-97.

This bibliography lists books dealing with computer applications and societal issues, programming and computer science, and teaching resources for educators using computers.

Goldenberg, Albert L. "A Beginner's Guide to Microcomputer Resources." *Audiovisual Instruction.* Vol. 24, No. 8 (November 1979), pp. 22-23.

This article presents a list of books, journals and newsletters related to microcomputers and also a list of manufacturers of microcomputers.

Huntington, John F. *Computer-Assisted Instruction Using BASIC.* Englewood Cliffs, New Jersey: Educational Technology Publications, 1979.

This book includes chapters on: BASIC, flowcharting, terminal commands, dialogues, learning theories and planning computer-based instruction. Each of the chapters contains an annotated bibliography.

Wang, Anastasia, ed. *Index to Computer-Based Learning, 1976 Edition.* Milwaukee, Wisconsin: Instructional Media Lab, 1976. (This document is available on microfiche only from: Instructional Media Laboratory, University of Wisconsin, P.O. Box 413, Milwaukee, WI 53201. Cost: $9.50)

Computer-based curriculum materials in 138 different subject areas are listed in this index. All the materials are cross-indexed by subject matter, programming language, central processor type, instructional strategies and sources.

The ERIC listings in this bibliography were produced by an ERIC search on the Dialog Information Retrieval System by Carla Hendrix, reference librarian, Lesley College Library (Cambridge, Mass.).

DATELINE: Starkville, Mississippi

Third and fourth graders in the Starkville gifted and talented program have their first introduction to computers at the local clothing manufacturing plant. The neighboring Garan plant uses computers to cut patterns and to do the payroll, and employees show the children how it all works. Children leave the tour with personal printouts to remind them of what they've seen.

The Garan plant is just one of several local establishments, including Mississippi State University, that share their computer facilities with the Starkville children. These children, the youngest in Starkville's computer awareness program, will, by the time they reach ninth grade, be programming in BASIC, FORTRAN and Pascal.

P.S.—
More Information Sources

ACM Guide to Computing Literature
ACM Order Department
P.O. Box 64145
Baltimore, MD 21264

Indexes all current computer science publications by bibliographic listing, author, key word, category and a Computing Reviews Reviewing Index. Some education listings.

Computing & Control Abstracts
IEEE
445 Hoes Lane
Piscataway, NJ 08854

This abstract is published monthly by The Institution of Electrical Engineers (IEE). It abstacts bibliographies, books, conferences, corporate authors and other subjects.

Directory of Online Information Resources
CGS Press
11301 Rockville, Pike
Kensington, MD 20795

The directory gives short descriptions of data bases, which are indexed by subject and vendor.

Eric System

ERIC is a national information system operated by the National Institute of Education. It has 16 clearinghouses, each serving a different area in education. The ERIC clearinghouses most likely to have information about children and computers are:

Educational Resources Information Center
Central ERIC
National Institute of Education
Washington, DC 20208
202/254-7934

Central ERIC is the clearinghouse for the clearinghouses. It should have the most up-to-date information on what each clearinghouse is doing.

ERIC Clearinghouse on Information Resources
Syracuse University
School of Education
130 Huntington Hall
Syracuse, NY 13210
315/423-3640

Published six mini-bibliographies on microcomputers in March 1980.

ERIC Clearinghouse for Junior Colleges
University of California at Los Angeles
Powell Library, Room 96
Los Angeles, CA 90024

Produces a publication on microcomputers in post-secondary education.

ERIC Clearinghouse on Elementary & Early Childhood Education
University of Illinois
College of Education
Urbana, IL 61801
217/333-1386

This ERIC clearinghouse is collecting information on young children and computers.

Microcomputer Index
2464 El Camino Real
P.O. Box 247
Santa Clara, CA 95051
408/241-8381

Quarterly index of 20 magazines in the microcomputer field; entries have up to four descriptors and are indexed by specific machine.

United States Legislature:

Computers and the Learning Society
Hearings in 1978. $1.80.
Order #052-070-04581-7 from:

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Information Technology in Education: Potentials and Perspectives
Hearings on April 2nd and 3rd, 1980. Free. Order from:

Science and Technology Committee
82-155 House Annex #2
Washington, D.C. 20515

DATELINE: Marshalltown, Iowa

School psychologist John Rendzio and colleagues at Special Education Services in Marshalltown are capitalizing on the computer's patient tutoring to teach money counting and time telling to mentally retarded students who are candidates for vocational training.

"These students need instruction broken down into bite-sized pieces and presented in a well-formed hierarchy," says Rendzio. "Furthermore, they often need repetition, with steps repeated in exactly the same sequence."

Rendzio's group is using off-the-shelf hardware for their project. They've added *Supertalker,* a voice digitizer available from Mountain Hardware, to an Apple II Plus with one disk drive and 48 K of memory. Children enter their responses with game paddles, obviating the need to spell or type; *Supertalker* enables students who can't read to use the program.

When the money-counting program begins, a penny drawn in high resolution graphics appears on the screen, with the words, "This is a penny." (*Supertalker* says the same.) After a pause, the screen changes and a column of various coins and the legend, "Find the penny" appear. An arrow points to each coin in turn. The student presses the game paddle button when the arrow reaches the coin he or she thinks is the penny. Appropriate rewards greet correct responses; the suggestion to "Look Again," incorrect ones.

Rendzio says that the programs allow ample opportunity for teacher participation. Teachers can hold any frame for as long as they like, and a book of supplementary, non-computer activities suggests exercises teachers can integrate into the lessons. For further information, contact: John Rendzio, Pleasant Hill School, 909 S. 12th St., Marshalltown, IA 50158.

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While most academics cry into their sherry over the lost, halcyon days of high enrollments and generous resources, educational computing professors puzzle over where to put the new computers and how to provide hands-on sessions for standing-room only classes. The educational computing market is bullish, and information is a prized commodity. Scores of universities and colleges now offer courses and programs in educational computing. Space constraints limit this list to those schools offering full degree programs in educational computing, but we'll fill you in on the rest in a future issue of *Classroom Computer News.*

COLUMBIA UNIVERSITY
Teachers College
525 West 120th St.
New York, NY 10027

212/678-3194

Contact: Dr. Steven M. Gorelick, Assistant Dean

Teachers College offers a 32-credit master's degree program in computing and education. This is an education degree specifically relating to computers, not a computer science degree.

Courses Include: Computers and the Language Arts; Computers and Writing; The Computer as Instructional Aid; programming courses in BASIC, Pascal and FORTRAN. The college also offers specialized conferences throughout the year.

LEHIGH UNIVERSITY
School of Education
524 Brodhead Ave.
Bethlehem, PA 18015

215/861-3241

Contact: Dr. Leroy J. Tuscher

Lehigh offers a master's of science in educational technology designed to train educators in the instructional use of microcomputers. The program is concerned with microcomputers in teaching, not with computer science or data processing.

Courses Include: Foundations of Instructional Programming in BASIC; Computer Literacy; Microcomputer-Aided Instruction; Learning, Technology and Society; Computer Organizations.

LESLEY COLLEGE GRADUATE SCHOOL
29 Everett St.
Cambridge, MA 02238

617/868-9600

Contact: Dr. June T. Fox, Program Counselor, or Dr. Nancy Roberts, Director, Computers in Education

Lesley offers a master's in education and a certificate of advanced graduate study in curriculum and instruction with a concentration in computers in education. These programs are for teachers, administrators, education writers and other professionals who wish to understand and to become skilled in computer use in education.

Courses Include: Computers in the Schools/Applied Uses for Teachers, Administrators and Specialists; Methods and Materials in Computers in Education; Computers and the Special Needs Student; Philosophical Considerations of Computers in Education; Creating an Educational Environment with LOGO.

NOVA UNIVERSITY
Office of New Programs
3301 College Ave.
Fort Lauderdale, FL 33314

305/475-8300

Contact: Dr. Robert L. Burke

Offers complete master's program and specialist program in computer education. The Computer Education Program is designed to prepare teachers to assume leadership roles in introducing microcomputers in Grades K-12. Teachers will learn to evaluate and select hardware and software for uses ranging from classroom management to direct instruction.

Courses Include: Microcomputing in the Curriculum; Information Science in the Classroom; Microcomputers in the Mathematics Classroom; Word-Processing with Microcomputers; Effective Functioning of School Media Centers; Curriculum Design and Microcomputers.

STANFORD UNIVERSITY
School of Education
Stanford, CA 94305

415/497-4793

Contact: Admissions Office, School of Education, or program directors Decke Walker (415/497-2102) and Robert Hess (415/497-4620)

Beginning this fall, Stanford will offer a master's degree in Interactive Educational Technology for students considering careers in educational computing. Through a combination of courses and field experience, students will develop the competence to write and to evaluate computer software for use in educational settings and to participate in other professional activities, including consulting and advising school districts.

STATE UNIVERSITY OF NEW YORK AT STONY BROOK
Nicholls Road
Stony Brook, NY 11794

516/246-8427

Contact: Dr. Ludwig Braun

The State University of New York at Stony Brook offers a master's degree program with an optional concentration in classroom computer use. The master's in technological systems allows students to take half their course work in educational computers; the other half is concerned with other modern technology in the classroom.

Courses Include: a computer literacy course for teachers and a software/courseware design course.

UNIVERSITY OF FLORIDA
College of Education
Gainsville, FL 32611

904/378-5953

Contact: Dr. Mary Grace Kantowski or Dr. Roy Bolduc

The university has a doctorate program in education that offers a minor or cognate in instructional computing; it is also considering instituting a master's degree program in educational computing which is still in the planning stages.

Courses Include: Computer-Assisted Instruction: PLATO; Computer-Assisted Instruction: Apple PILOT; Applications of the Microcomputer to the Classroom; Introduction to Instructional Computing.

UNIVERSITY OF ILLINOIS
Department of Education
1310 S. 6th St.
Champagne, IL 61820

217/333-1000

Contacts: Dr. Richard Dennis (Secondary Education)
217/333-4664
Dr. Stanley Trollip (Educational Psychology)
217/333-8526

The departments of Educational Psychology and of Secondary Education both offer degree programs in educational computing.

The Department of Educational Psychology offers a master's degree in Instructional Design with a specialization in computer applications. Some of the courses offered in the program include: Instructional Design for Computer-Based Instruction; Instructional Systems and Computer-Managed Instruction.

The Department of Secondary Education offers master's, Ph.D. and Ed.D. degrees in Instructional Applications of Computers. Courses include: Computer-Assisted Instruction: An Overview; Computers in Mathematics; Computers in Science; Computers in the Social Sciences; Instructional Computing for Teachers—BASIC; Instructional Computing for Teachers—Pascal.

UNIVERSITY OF OREGON
Department of Computer and
Information Science
Eugene, OR 97403

503/686-4408

Contact: Dr. David Moursund

The university offers a master's in Computer Science Education and a doctorate in education with an emphasis in computers in education. Enrolling students are required to have the equivalent of two terms of programming instruction behind them. The master's coursework is divided between general education courses, programming courses, general computing courses on topics such as artificial intelligence and graphics, and special computers and education courses. Both programs require theses in educational computing.

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Centers, Sources and Sorcerers

Steve Lynch ©

We began organizing this issue with the best programming discipline as our guide. We flow-charted the contents. We organized our tasks in lines, loops and branches: if article deals with hardware, then go to yellow folder; if article deals with software, then go to red. We went through dozens of mental loops, and were trapped, we're afraid, in more than one that seemed infinite: for information on vendor A, send out letter. Next vendor. For information on vendor B, send out letter. Next vendor . . . . We patterned our lists after subroutines—one for resource centers, one for in-service trainers, one for systems consultants—and when we were finished. my did we feel structured.

And then the information began arriving.

The yellow folder disappeared under the seemingly endless pile of vendor responses and our subroutines kept short-circuiting our CPU's (for Carefully Planned Units). Which brings us to the point of this preamble to our final list.

The neat categories we'd conceived one Sunday afternoon, while summer was but a memory of last year's roses, faded as the days grew warmer and we spent hour after frustrating hour trying to decide whether MECC was a user group, resource center or software vendor (answer: all of the above); whether TERC belonged under training groups, resource centers or consultants. In the educational computing field, we discovered, practically anybody who's doing anything is doing everything.

And so we shunned the categorical imperative and decided instead on this list of lists—a general guide to centers and sources and even a sorcerer or two.

ALAMEDA COUNTY OFFICE OF EDUCATION
224 West Winton Ave.
Hayward, CA 94544
415/881-6201

Contact: Glenn Fisher, School Computer Specialist

Alameda County Office of Education is currently obtaining public domain software to distribute; assisting teachers through publications, workshops and consultations; coordinating review of teacher-contributed software with similar review efforts in other Bay-area counties. The goal is to publish the reviews. Several other county offices of education in California are also establishing computing projects.

APPLE COMPUTER CLEARINGHOUSE FOR THE HANDICAPPED
Prentke Romich Company
R.D. 2, P.O. Box 191
Shreve, OH 44676
216/767-2906

Contact: Neil Russel, Computer Manager

Prentke Romich Company, a firm that manufactures electronic aids for the severely handicapped, is starting a clearinghouse for information about Apple software being developed to aid individual handicapped people. A catalog will offer descriptions, operational instructions and information on essential hardware and prices. Individuals wishing to share programs they have developed may do so by requesting and submitting an application form. Prentke Romich also develops custom software.

BOCES
New York State

BOCES (Board of Cooperative Educational Services) throughout New York State are now helping teachers with computer-based projects. Some, such as the Putnam-North Westchester BOCES, which has a computer center run by Walter Koetke, have very active programs. New York teachers should check with their local BOCES to see what services are offered.

COMPUTERS IN EDUCATION AS A RESOURCE (CEDAR)
Exhibition Rd.
London S.W. 7, United Kingdom
01-589-5111, ext. 1160

Contact: Nick Rushby or Judith Morris

CEDAR, a project at the Imperial College, has developed an information and advisory service to assist teachers with computer-based and computer-managed learning. CEDAR maintains a resource file and lists of people working on educational computing projects in the United Kingdom. It also provides technical consulting and seminars on educational computing.

COMPUTER LITERACY

1466 Grizzly Park Blvd.
Berkeley, CA 94707
415/644-2400

Contact: Arthur Luehrmann, Herbert Peckham or
Martha Ramirez

Computer Literacy offers hands-on courses in computing to teachers and others in the community. It will also provide strategic planning for computer education in the schools and will develop computer literacy curricula for schools.

CONDUIT

P.O. Box 388
Iowa City, IA 52244
319/353-5789

Contact: James Johnson, Director

CONDUIT is a source of instructional materials and a research and development center. Its biannual publication, *PIPELINE,* is a source of information about the use of computers in higher education. While all CONDUIT software is written for college use, some is appropriate for advanced high school science and math classes. CONDUIT welcomes software submissions, with the caveat that programs must be suitable for post-secondary instruction. Detailed author guidelines are available.

COURSEWARE, INC.

10075 Carroll Canyon Rd.
San Diego, CA 92131
714/578-1700

Contact: Eugene H. Regard

Courseware, Inc. custom designs materials to suit the needs of its clients. It has worked with the San Diego school system to develop a minimum competency curriculum.

DATASPAN

University of Michigan
109 E. Madison St.
Ann Arbor, MI 48104
313/763-4410

Contact: Karl Zinn

DATASPAN, a project funded by the National Science Foundation, will develop, disseminate and update an information bank on computer applications in science education. It will also report on, package and distribute exemplary software packages and will help establish teleconferencing systems.

DRESDEN ASSOCIATES

P.O. Box 246
Dresden, ME 04342
207/737-4466

Contact: Bob Haven

Dresden Associates publishes *School Microware Directory* and *School Microware Reviews.* Bob Haven, company founder (formerly with Project LOCAL, Massachusetts), also consults on a paid basis.

EDUCATIONAL TECHNOLOGY CENTER

University of California
Irvine, CA 92717
714/883-6945

Contact: Al Bork

The Educational Technology Center strives to enhance the learning process through the use of computers and other advanced technology. Center activities range from research to curriculum development. Three current projects are: developing testing and tutorial materials for large, university science courses (the resulting materials will be released through CONDUIT); developing science literacy materials for use in public places; producing computer-based learning materials for junior high students.

EDUCATOR'S HOT LINE

Vital Information, Inc.
913/384-3860

Contact: Jerry Van Diver

Vital Information, Inc., publisher of *Educator's Handbook and Software Directory* and *VanLoves 1981 Apple II/III Software Directory,* also provides a free hot line. Will answer any questions about software and classroom or administrative applications.

EPIE INSTITUTE

P.O. Box 620
Stony Brook, NY 11790
516/246-8664

EPIE is the country's only educational consumer advocacy group. It alerts members—school districts, educational agencies, libraries—to inferior, unsafe or questionable products. EPIE has just instituted a series of national seminars on software evaluation and, along with the Microcomputer Resource Center at Columbia University, is evaluating the larger, commercially available curriculum packages.

FLORIDA EDUCATIONAL COMPUTING PROJECT

Department of Education
109 Knott Building
Tallahassee, FL 23201
904/488-1234

Contact: Mr. Briton

The Florida Educational Computing Project began in 1977, when the state legislature passed a bill supporting educational computing in the state. The project hired consultants to advise schools, examined state resources for teaching basic computing skills, explored the possibility of establishing a computer guidance system, published software evaluations and sponsored computer literacy seminars. Work is now in progress for establishing a Florida State Instructional Computing Center.

HUMAN RESOURCES RESEARCH ORGANIZATION (HumRRO)

300 North Washington St.
Alexandria, VA 22314
703/549-3611

Contact: Beverly Hunter

HumRRO is a behavioral science research organization that has undertaken several projects involving computer-assisted instruction. It is currently working on a curriculum guide for computer literacy. In December 1980, HumRRO and MECC held a joint conference on goals for computer literacy. A report on that conference, *National Goals for Computer Literacy,* will be forthcoming.

INTENTIONAL EDUCATIONS

51 Spring St.
Watertown, MA 02172
617/923-7707

Contact: Laura Koller

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DATELINE: Richfield, Idaho

Wondering where to keep your tapes, disks, cables, cords and what not? Project TEAMS—Tables for Experience Activities in Math Skills—offers one solution. This Title IV-C program for all kindergarten through sixth-grade students in Lincoln County, Idaho, uses mobile tables to organize its computer literacy materials. Each of the county's three grade schools has three tables, organized for Grades K-2, 3-4 and 5-6. The tables hold a wide variety of learning games, manipulative materials, electronic equipment and, for the upper two grade tables, TRS-80 microcomputers. The tables wheel easily from room to room, providing easy access for all students. The overall goal of the program is to improve students' math skills and attitudes through the use of commercial materials and individualized instruction. For further information, contact: Sandra Calkins, Project Director, Richfield School, Box E, Richfield, ID 89349.

LABORATORY FOR PERSONAL COMPUTERS IN EDUCATION
State University of New York
Stony Brook, NY 11094
516/246-8418

Contact: Ludwig Braun

The lab contains a variety of personal computers and software. Staff teach courses within the university's school of education and hold periodic workshops for teachers.

MATH CITY
4040 Palos Verdes Drive North
Rolling Hills Estates, CA 90274
213/541-3377

Contact: Blair Sullivan

Math City teaches classes on computer literacy and computer-assisted math instruction. It also produces software for first grade through graduate school classes. *Mathware* is a package for Grades 1-8 for the Apple II; an algebra program will be available in November 1981.

MATH/COMPUTER EDUCATION PROJECT
Lawrence Hall of Science
University of California
Berkeley, CA 94720
415/642-3167

Lawrence Hall of Science offers workshops for both teachers and students, both at the hall and at schools. The options include: workshops in math, computing and problem solving for teachers; on-going or one-time workshops on math and computers for students. Teachers can bring entire classes to the hall for a series of workshops.

MICRO CO-OP
P.O. Box 432
West Chicago, IL 60185
312/231-0912

Micro Co-op is a software cooperative that makes Apple and Atari software available to members at a 10 percent discount. It publishes a bimonthly newsletter that provides product listings and objective comparisons of existing products. The coop is not tied to any software publisher, although it does market its own products under the Co-op Software label. Membership is a one-time $3.00 fee. Each year, membership is automatically renewed for any member who has made at least one purchase during the preceding year.

MICROCOMPUTER CENTER
San Mateo Educational Resources Center Library
333 Main St.
Redwood City, CA 94063
415/363-5469

Contact: Ann Lathrop

The Microcomputer Center offers educators in San Mateo County an opportunity to sample a variety of computers and to preview and evaluate educational software. It houses the *Softswap* (see page 33) and provides inservice training. Educators from other counties are welcome to use the center's resources on an informal basis. Groups of three or more should phone ahead for an appointment.

THE COMPUTING TEACHER

- Computers in Elementary Education
- Computers in Junior High School
- Computers in High School
- Computers in Teacher Education

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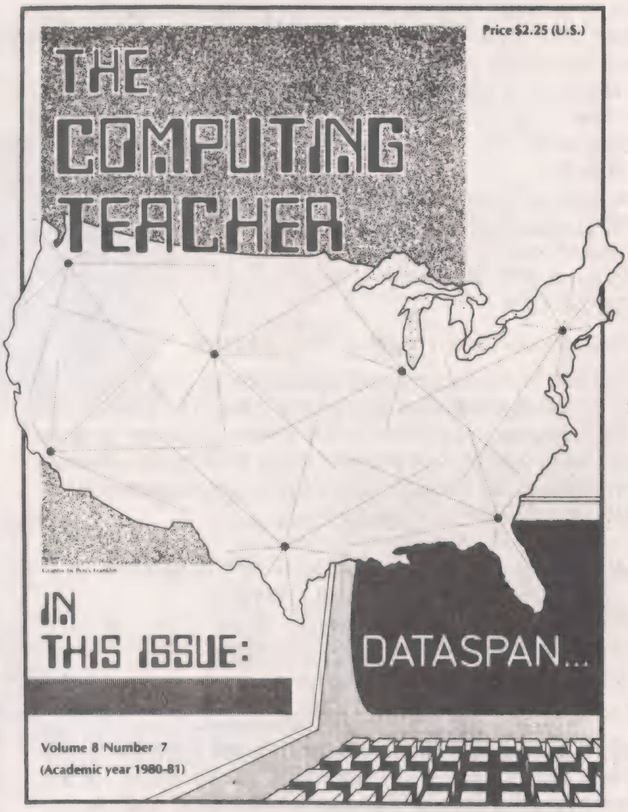

The Computing Teacher is a journal for all elementary and secondary school teachers who are making instructional use of computers or who are concerned with how computers are affecting the content and process of education. Each issue contains information of use both to the very beginner and to the experienced user of computers. Topics covered include teaching using computers, teaching about computers at all grade levels, and use of computers as an aid to problem solving in all disciplines.

The Computing Teacher is a publication of the International Council for Computers in Education, a non-profit professional organization of educators. ICCE has members from every state in the United States and from several different countries. ICCE is dedicated to helping teachers cope with computers in education and to improving education at all levels.

There will be nine issues of *The Computing Teacher* published during the 1981-82 academic year. Subscribe now!

MICROCOMPUTER RESOURCE CENTER
Teachers College
Columbia University
525 W. 121st St.
New York, NY 10027
212/678-3740

Contact: Karen Billings, Director

During the afternoon and early evening, educators are welcome to drop in to use the center's hardware, software, journals and books. During other hours, the center conducts seminars and workshops on a reserved appointment basis. The seminars and workshops generally concern hardware/software problems, curriculum materials and staff training. The Microcomputer Resource Center and EPIE Institute are jointly evaluating the major, commercially available, computer-based curriculum packages.

MicroSIFT
Northwest Regional Educational Laboratory
500 Lindsay Building
710 2nd Ave., S.W.
Portland, OR 91204
503/248-6974

Contact: Don Holtznagel or Judy Edwards

MicroSIFT (Microcomputer Software and Information for Teachers) is a National Institute of Education-funded clearinghouse for K-12 microcomputer software reviews and information. The project hopes to establish effective procedures for collecting, evaluating and disseminating software reviews (see page 26).

MICROCOMPUTER EDUCATION APPLICATIONS NETWORK (MEAN)
256 N. Washington St.
Falls Church, VA 22046
703/536-2310

Contact: Alfred J. Morin, Director

MEAN helps educators develop and sell software; it conducts workshops on microcomputer applications for administrators and teachers; and it helps local districts and state education agencies develop educational computing programs. MEAN also publishes a newsletter.

MINNESOTA EDUCATIONAL COMPUTING CONSORTIUM (MECC)
2520 Broadway Drive
St. Paul, MN 55113
612/376-1101

Contact: Don Rawitsch, Manager of User Services

MECC serves all public education institutions in Minnesota, including universities and colleges. It coordinates the state's educational computing efforts, provides inservice training and support in the areas of instructional computing and management information systems, develops and sells software for the Apple, and publishes a newsletter.

NATIONAL EDUCATION ASSOCIATION
1201 16th St., N.W.
Washington, D.C. 20036

Contact: Sharon Robinson, Director of Instructional and Professional Development

NEA is gathering information on the use of all instructional technologies and is planning to conduct a national survey on the use of technology in the classroom. Written materials are available to members requesting information on instructional technologies.

SCIENCE TEACHING CENTER
International Clearinghouse
University of Maryland
College Park, MD 20742
301/454-2024

This clearinghouse collects and distributes curriculum materials developed in science and math education projects that the U.S. government funds. It doesn't distribute computer-based materials yet, but this may change as more government projects generate computer-based materials.

THE NORTH CAROLINA INSTRUCTIONAL COMPUTING PROJECT
116 W. Edenton St.
Education Building, Rm. 58
Raleigh, NC 27611
919/733-4695

Contact: Margaret H. Bingham, Project Coordinator

This state-run project provides one-day inservice sessions on microcomputer awareness for teachers in the North Carolina schools, and more intensive training for administrators and microcompter consultants. It maintains the Educational Media Review and Evaluation Center, which reviews software and makes those reviews available to visiting teachers. The center has prepared a comprehensive software evaluation form. Ms. Bingham, project coordinator, will consult with educators interested in establishing similar state-run projects.

TECHNICAL EDUCATION RESEARCH CENTERS, INC. (TERC)
Computer Resource Center
8 Eliot St.
Cambridge, MA 02138
617/547-3890

Contact: Dan Watt

TERC provides workshops, information services, consulting and other help with educational computing. Its Computer Resource Center has open house on Wednesdays, when visitors can try out computers and software. Membership is available to those who want to use the center at other times.

RUSS WALTER
92 St. Botolph St.
Boston, MA 02116
617/265-8128

An expert on computers and programming, Russ Walter is a one-man computing hot line. He'll give advice over the phone at any time, night or day. He is the author of several books, including *The Secret Guide to Computers,* and is director of the Wesleyan Summer Computer Institute, now in its eighth year. Mr. Walter is available as a consultant.

UNIVERSITY OF WASHINGTON COMPUTING INFORMATION CENTER
3737 Brooklyn Ave., N.E.
Seattle, WA 98105
206/543-5818

This computing resource center contains 5,000 books, 6,000 technical reports and 570 periodicals covering all aspects of computing. The center's purpose is to provide access to computing literature—including that on educational computing. Specialized bibliographies, reference services and borrowing privileges are available. It publishes a bimonthly magazine, *Computing Resources for the Professional.*

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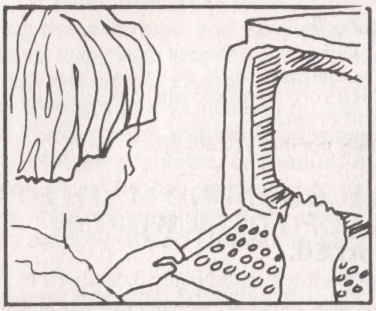

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CALENDAR

July

National Science Teachers Association (NSTA). Late July-August. Boston, Massachusetts. Conference on secondary school software development. Contact: NSTA, 1742 Connecticut Ave., Washington, D.C. 20009; 202/328-5840.

August

Revival 5! for Education. August 3-7. Fairfield University, Fairfield, Connecticut. An intensive five-day graduate institute with one segment on computing. Contact: Joanna Nicholson, Fairfield University, North Benson Rd., Fairfield, CT 06430; 203/255-5411, ext. 2138.

Computers in Education Workshop. August 10-14. East Stroudsburg State College, East Stroudsburg, Pennsylvania. Computer literacy, hardware and software evaluation, etc. for elementary and secondary school teachers. Contact: Terry C. Giffel, Associate Professor, Department of Educational Communications and Technology, East Stroudsburg State College, East Stroudsburg, PA 18301; 717/424-3621.

Computer Literacy/Introduction to BASIC, PILOT, DYNAMO, LOGO. August 10-21, Mon.-Fri., 1-4 p.m. Lesley College, Cambridge, Massachusetts. An introductory course for those with no computer experience. Three credits. Contact: Dr. Nancy Roberts, Director, Computers in Education, Lesley College Graduate School, 29 Everett St., Cambridge, MA 02238.

Microcomputer Supported Instruction. August 11-20, Tues.-Thurs., 9-11:30 a.m. BOCES Campus, Yorktown Heights, New York. A workshop for those with no computer experience. Contact: Sue MacMaster or Walter Koetke, BOCES, Yorktown Heights, NY 10598; 914/245-2700, ext. 284.

Educator's Seminar: Technical Update. August 11-13. Purdue University Conference Center, West Lafayette, Indiana. Contact: Giles R. Flanagan, 909 Mayfair Rd., Milwaukee, WI 53226.

Third Annual Conference on Interactive Video Learning Systems. August 12-13. L.A. International Airport Marriot Hotel, Los Angeles, California. Sponsored by The Society for Applied Learning Technology (SALT). Will address advances in the use of interactive videotape and applications of the videodisc. Contact: SALT, 50 Culpeper St., Warrenton, VA 22186; 703/347-0055.

The Fifth Annual National Small Computer Show. August 26-29. New York Coliseum, New York City. Contact: The National Small Computer Show, 110 Charlotte Pl., Englewood Cliffs, NJ 07632; 201/569-8542.

September

Information Processing Administrators of Large School Systems (IPALSS). September 24-25. Imperial Palace, Las Vegas, Nevada. IPALSS annual fall meeting. Contact: Ron Jones, Clark County School District, 2832 E. Flamingo Rd., Las Vegas, NV 89121; 702/736-5405.

October

Classroom Applications of Computers. October 2-3. Independence High School, San Jose, California. Co-sponsored by Computer-Using Educators (CUE) and Santa Clara Valley Mathematics Association. Steve Jobs, co-founder of Apple Computer Inc., will be keynote speaker. Contact: W. Don McKell, Computer-Using Educators, Independence High School, 1776 Educational Park Drive, San Jose, CA 95133; 408/288-7642.

The Educational Software Show. October 15-16. Stouffer's Inn, White Plains, New York. Will cover designing and evaluating educational software and a variety of applications. Sponsored by Queue. Contact: Monica Kantrowitz, Queue, Inc., 5 Chapel Hill Drive, Fairfield, CT 06432; 203/372-6761.

NYSAEDS Annual Conference. October 18-20. Syracuse, New York. The New York State Association for Educational Data Systems conference will focus on software. Contact: Don Ross, Ardsley High School, Ardsley, NY 10502.

WHAT? WHERE? WHO?

Computer Literacy
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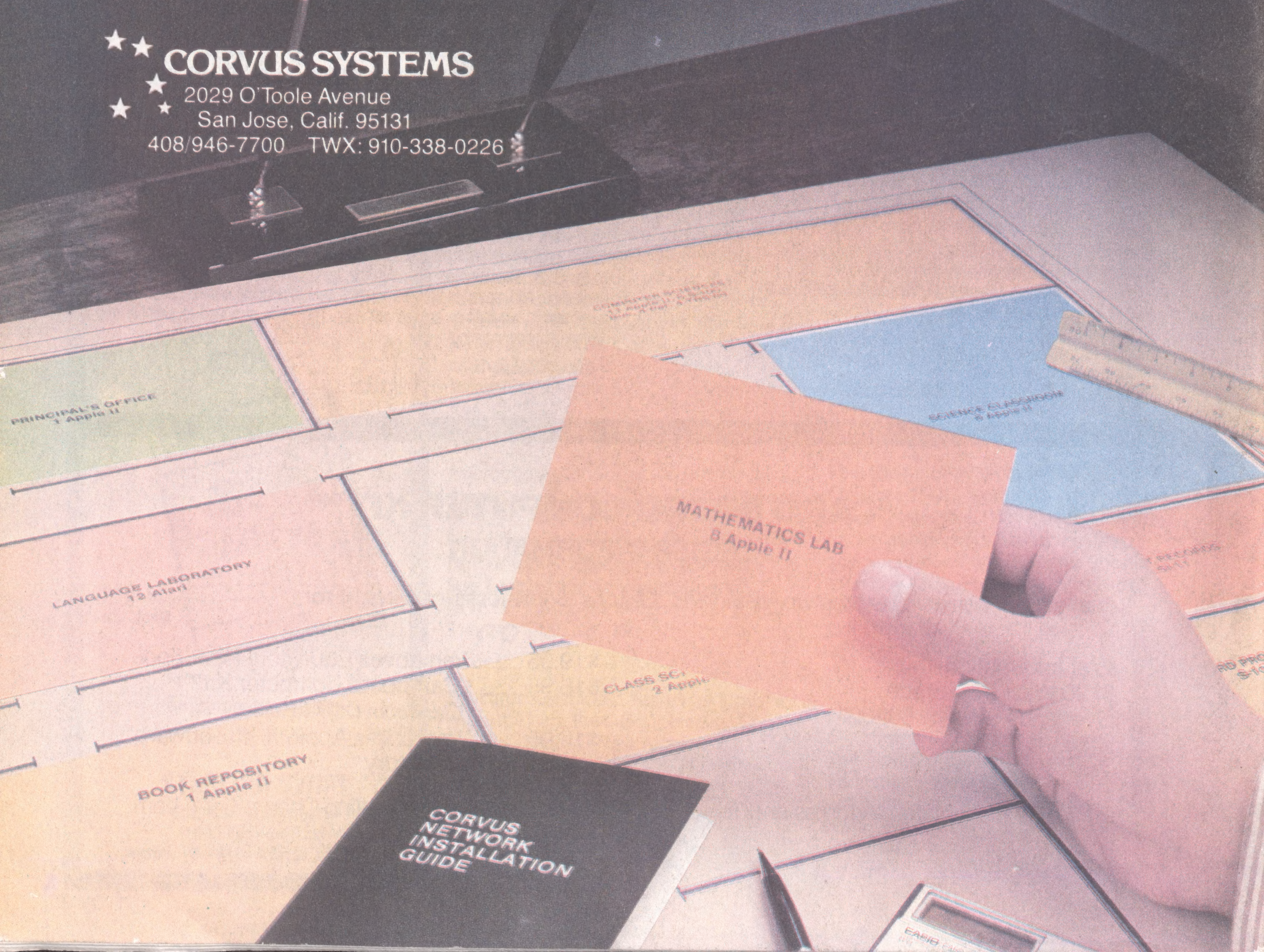
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